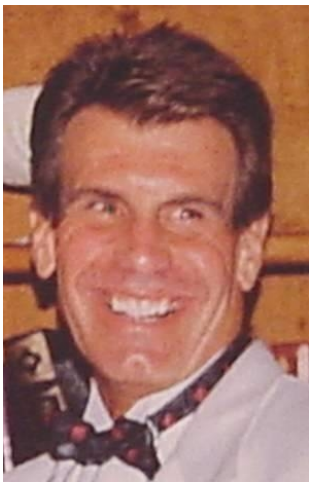
REGIONAL HAZE STATE IMPLEMENTATION PLAN FOR THE STATE OF ARIZONA

Air Quality Division
Arizona Department of Environmental Quality

December 23, 2003

Acknowledgement



Greg Witherspoon
(July 4, 1948 – December 24, 2001)

Greg Witherspoon committed his professional career to the advancement of balanced environmental policies and programs in Arizona. He worked at the Salt River Project for over 20 years as a Principal Environmental Scientist. In this capacity, he was engaged in numerous environmental matters affecting power utilities and Arizona's natural resources.

Among his many duties at SRP, Greg was actively involved in advancing air quality policies that would protect the public's enjoyment of the spectacular scenery in Arizona's national parks and wilderness areas. Greg participated in several technical committees to support the work of the Grand Canyon Visibility Commission in addressing regional haze visibility impairment in the Grand Canyon National Park and other Class I areas on the Colorado Plateau. He worked with other stakeholders throughout the west to advance technical and regulatory policies necessary to achieve long-term reductions of visibility impairing emissions. Greg was a champion of market based emission reductions as the vehicle for achieving air quality goals in the most cost effective manner. Greg was the consummate professional throughout the stakeholder process. He came to meetings thoroughly prepared. He readily shared his expertise and valued the input of others. He sought to build consensus among all the stakeholders throughout the process. Greg was instrumental in helping Arizona decide to base its Regional Haze State Implementation Plan on the program conceived by the Grand Canyon Visibility Commission and developed by its successor organization, the Western Regional Air Partnership.

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EXECUTIVE SUMMARY

This Arizona State Implementation Plan (SIP) addresses the requirements of Title 40 of the Code of Federal Regulations, Part 51, Subpart P – Protection of Visibility (40 CFR 51.300-307, and 309). The SIP describes the programs that the State will rely upon to make reasonable progress toward "preventing any future and … remedying any existing impairment of visibility" in the large parks and wilderness areas in Arizona and those in other states that may be affected by pollution generated in Arizona (Class I areas). The federal regional haze rules require states to develop and submit SIPs for improving visibility through the year 2018 that make reasonable progress toward achieving "natural visibility conditions" by the year 2064. This SIP is designed to adopt the basic visibility program that addresses impairment of visibility that can be traced to older major industrial sources and implements recommendations adopted by the Grand Canyon Visibility Transport Commission (GCVTC) in its 1996 report to EPA. The Western Regional Air Partnership (WRAP) is the successor organization to GCVTC, and, in addition to being chartered to implement the GCVTC's recommendations, provides the mechanism for states and tribes to coordinate efforts and pool resources to conduct the complex technical analyses necessary to develop the science that is part of the foundation of regional haze SIPs. Arizona State government officials and employees and a variety of Arizona stakeholders actively participate in WRAP committees and workgroups to direct the policy and technical products of the WRAP. As such, this SIP revision relies on much of the work conducted by WRAP staff and contractors.

Chapters 1 through 4 of this SIP include introductory and background information about visibility protection and regional haze. Chapter 5 is the plan for implementation of the rules and regulations addressing reasonably attributable visibility impairment, in addition to monitoring, planning, and new source review requirements under 40 CFR 51.300-307. Chapters 6 through 17 include Arizona's approach to meeting the requirements for developing long-term visibility improvement strategies for regional haze under 40 CFR 51.309. Chapter 18 summarizes the public participation process in developing this SIP as required under 40 CFR 51.102.

Table ES-1 summarizes the requirements in 40 CFR 51.302-307 for reasonably attributable visibility impairment, the approach taken by the State of Arizona to address the requirements, and the chapter in this SIP addressing the requirements.

Table ES-1. Requirements for Reasonably Attributable Visibility Impairment Under 40 CFR 51.302 through 307

Requirements of	Summary of Approach, Content, or Findings	Chapter in SIP
40 CFR 51.302 Implementation control strategies for reasonably attributable visibility impairment.	Arizona has promulgated regulations in 2003 to address the implementation of controls, as needed, for sources subject to the best available retrofit technology requirements of the 1977 Clean Air Act for reasonably attributable visibility impairment (RAVI).	5.1
40 CFR 51.303 Exemptions from control.	Arizona has incorporated into the Arizona RAVI rule the necessary provisions to address the petition of BART emissions limits to the EPA Administrator.	5.2
40 CFR 51.304 Identification of integral vistas.	No integral vistas were identified for the Class I areas on the Colorado Plateau addressed by this SIP or the other Additional Class I areas in Arizona.	5.3

Requirements of	Summary of Approach, Content, or Findings	Chapter in SIP
40 CFR 51.305 Monitoring for reasonably attributable visibility impairment.	Arizona established a comprehensive visibility monitoring program for the Class I areas and other transport sites in 1996. Arizona is an associate member of the IMPROVE Steering Committee and ensures information from the Arizona network is submitted as required, and participates in the technical leadership of the overall IMPROVE program.	5.4
40 CFR 51.306 Long-term strategy requirements for reasonably attributable visibility impairment.	Arizona has included in the SIP comprehensive long-term strategy components to address regional haze visibility impairment and RAVI from BART eligible sources.	5.5
40 CFR 51.307 New source review.	Arizona's R18-2-410 (Article 4, New Source Review, Arizona Administrative Code) address requirements of new sources to meet performance standards to assure emissions will not have an impact on visibility.	5.6

Table ES-2 summarizes the requirements in 40 CFR 51.309 for regional haze, the approach taken by the State of Arizona to address the requirements, and the chapter in this SIP addressing the requirements.

Table ES-2. Summary of Requirements for Regional Haze Visibility Impairment Under 40 CFR 51.309

Requirement of 40 CFR 51.309	Summary of Approach, Content, or Findings	Chapter in SIP
(d)(1) Time Period Covered	This SIP addresses reasonable progress at the Class I areas on the Colorado Plateau from December 31, 2003 through December 31, 2018.	1.1
(d)(2) Projection of Visibility Improvement	Projected emissions and estimated visibility changes for each of the Class I areas on the Colorado Plateau were performed by the Western Regional Air Partnership (WRAP).	Ch. 14
(d)(3) Treatment of Clean Air Corridors	The only Clean Air Corridor for the Class I areas on the Colorado Plateau does not include any area within Arizona. Arizona will include the results of future analyses in its periodic plan revisions.	Ch. 6
(d)(4), (f), and (h) Implementation of Stationary Source Reductions	General stationary source requirements are contained in Chapter 7. Chapter 8 contains a description of the SO_2 Milestone and Backstop Trading Program.	Ch. 7 (general) Ch. 8 (SO_2)
(d)(5) Mobile Sources	Federal programs (such as low sulfur diesel, engine standards, etc.) are identified and describe mobile source emissions throughout the planning period.	Ch. 9

Requirement of 40 CFR 51.309	Summary of Approach, Content, or Findings	Chapter in SIP
(d)(6) Programs Related to Fire	Arizona revised its open burning and smoke management regulations (A.A.C. R18-2-602 and A.A.C R18-2-1501 - 1515) to address the federal requirements.	Ch. 10
(d)(7) Area Sources of Dust Emissions From Paved and Unpaved Roads	WRAP's analysis concluded dust emissions from paved and unpaged roads are currently not a significant regional contributor to visibility impairment within the Colorado Plateau 16 Class I areas. Arizona will continue to support further research on this issue, as it develops its periodic plan revisions under 40 CFR 51.309(d)(10).	Ch. 11
(d)(8) Pollution Prevention	Programs and policies within Arizona related to renewable energy and energy efficiency are described.	Ch. 12
(d)(9) Additional Recommendations	The status of implementation of other strategies and options in the Grand Canyon Visibility Transport Commission Report are summarized. In addition, an overview of sources in and near each Arizona GCVTC Class I area is included.	Ch. 13
(d)(10) Periodic Revisions	Arizona will submit periodic plan revisions to this SIP in 2008, 2013 and 2018.	Ch. 16
(d)(11) State Planning and Interstate Coordination	Arizona has and will continue to participate in the WRAP. As periodic plan revisions are done, consultation will also be made with states and tribes not implementing 40 CFR 51.309.	Ch. 15
(f)(4) **Geographic Enhancement**	WRAP has developed a model MOA to be executed by Arizona and Federal Land managers to address geographic enhancement of the regional haze SO_2 Milestone and Backstop Trading Program (Ch. 8) for reasonably attributable visibility impairment.	Ch. 8 in 8.5
(g) Reasonable Progress for Additional Class I Areas	**A supplement to this plan revision to address regional haze at the Additional 8 Class I areas in Arizona will be developed in accordance with 40 CFR 51.309(g)(2-3) and submitted by December 31, 2008.**	Ch. 17

While the above tables are organized in the order of the provisions of the regional haze rule, the SIP itself is organized according to the logic of pollution control plans. Consequently, the chapters of the SIP do not correspond precisely to the order of the requirements in the regional haze rule.

Finally, the Technical Support Document (TSD) developed by the Western Regional Air Partnership (WRAP) is a reference for this SIP (herein referred to as the "WRAP TSD").

1. BACKGROUND

1.1. Introduction

Good visibility is important to fully enjoy the experience of visiting the State's and Country's national parks and wilderness areas. Visibility is how far and how well a person can see, and can be reduced or impaired by light scattering and absorption caused by particulate matter and gases in the atmosphere that occur from both natural and human-caused activities. Visibility impairing natural sources may include rain, wildland fires, volcanic activity, and wind blown dust. Visibility also can be impaired by human-caused sources of air pollution such as industrial processes, (utilities, smelters, refineries, etc.), mobile sources (cars, trucks, trains, etc.) and area sources (residential wood burning, prescribed burning, agricultural activities, wind blown dust from disturbed soils, etc.)

Congress established a program to protect visibility in the larger national parks and wilderness areas which referred to as the mandatory Class I Federal areas (herein referred to as "Class I areas"). The State of Arizona is submitting this SIP to address the requirements (40 CFR 51.300-307) for visibility protection in the Class I areas and remove the existing Federal Implementation Plan (FIP) (52 FR 45132, November 24, 1987). This SIP also fulfills the requirements under 40 CFR 51.309 for Arizona's 4 Colorado Plateau Class I areas in addition to the other 12 Class I areas studied by the Grand Canyon Visibility Transport Commission (GCVTC). It contains all necessary measures to address reasonably attributable visibility impairment and regional haze visibility impairment necessary to ensure the State of Arizona makes reasonable progress toward the national goal for visibility contained in 42 U.S.C. 7491 (Clean Air Act), specifically "...the prevention of any future, and remedying of any existing impairment of visibility in mandatory Class I Federal areas, which impairment results from man-made air pollution." The Regional Haze Rule (RHR) defines this goal as achieving natural visibility conditions by 2064. This SIP addresses reasonable progress toward the national goal for the planning period from December 31, 2003 thorough December 31, 2018.

1.2. Definitions

This SIP duplicates terms and phrases defined in 40 CFR 51.301, 40 CFR 51.309(b), and other terms specific to the programs set forth in this Plan. These definitions are contained in Appendix A-1a of this SIP.

1.3. 1977 Clean Air Act

In the 1977 Clean Air Act (CAA), Congress established requirements for the prevention of significant deterioration of air quality in areas within the United States and for the review of pollution controls on new sources.[1] Coupled with this, Congress established a visibility protection program and the national goal (Section 169A) for larger national parks and wilderness areas.[2] The visibility protection program also requires states to address any visibility impairment caused by emissions of air pollutants from certain large industrial sources if the source was less than 15 years old as of August 1977, through the establishment of emission limits based on best available retrofit technology (BART). Congress also

[1] *Clean Air Act Amendments of 1977*, United States Congress. 42 U.S.C. 7470-7479. Government Printing Office: Washington, D.C. August 7, 1977.

[2] *Clean Air Act Amendments of 1977, Section 169A*, United States Congress. 42 U.S.C. 7491. Government Printing Office: Washington, D.C. August 7, 1977.

established mandatory criteria for states to use when establishing BART emission limits and developing long-term strategies for reasonable progress toward the national goal.

1.4. Reasonably Attributable Visibility Impairment

In 1980, the United States Environmental Protection Agency (EPA) issued final regulations to address the requirements of the 1977 Clean Air Act, requiring states with Class I areas to submit State Implementation Plan (SIP) revisions with new source review plans, monitoring plans, BART implementation plans, and long-term strategies to address reasonable progress toward the national visibility goal.[3] Arizona did not submit a SIP to address visibility, and in 1987 (52 FR 45132) EPA issued a Federal Implementation Plan.

1.5. 1990 Clean Air Act

Although the 1980 regulations addressed reasonably attributable visibility impairment from specific sources, also know as plume blight, it did not adequately address visibility impairment from large collections of sources whose emissions are mixed and transported over long distances, creating a uniform haze (regional haze). In the 1990 amendments to the Clean Air Act (CAA), Congress established the requirements to address regional haze visibility impairment, giving the EPA authority to establish visibility transport commissions and promulgate regulations to address regional haze, and requiring the establishment of a visibility transport commission to investigate and report on regional haze visibility impairment in the Grand Canyon National Park located in northern Arizona.[4]

The Regional Haze SIP meets the requirements of Section 110, Implementation Plans, of the CAA. Demonstration of the public review process can be found in Chapter 18 and its related Appendix. Information to satisfy Section 110(a)(2)(E), adequate personnel to carry out such an implementation plan, can be found in Appendix A-1b).

1.6. Grand Canyon Visibility Transport Commission

In response to the 1990 CAA, the Grand Canyon Visibility Transport Commission (GCVTC) was established in November 1991. Membership evolved over the approximately four and one-half years of its activities. When the GCVTC issued recommendations to EPA in June 1996, membership consisted of eight western governors (or their designees), four western tribal leaders, five ex-officio members representing federal land management agencies, an ex-officio tribal representative, and EPA. The transport region studied by the GCVTC consisted of nine western states: Arizona, California, Colorado, Idaho, New Mexico, Nevada, Oregon, Utah, and Wyoming. Arizona's Governor Symington chaired the GCVTC. The GCVTC members agreed to expand the scope of technical and policy studies to include all 16 of the Class I areas on the Colorado Plateau. The GCVTC elected to use a stakeholder-driven process to accomplish its objectives to review current science and policy information and determine what actions, if any, were needed to address regional haze visibility impairment at the Class I areas on the Colorado Plateau. Ultimately, the organization included over 200 political, policy and technical stakeholders, who staffed a variety of committees and subcommittees. The GCVTC was funded by EPA grants and contributions from stakeholders, including substantial in-kind labor. The GCVTC submitted its recommendations to EPA in June 1996.[5] The major recommendations of the GCVTC included:

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[3] *40 CFR Part 51 - Protection of Visibility*, United States Environmental Protection Agency, 45 FR 80089. Government Printing Office: Washington, D.C. December 2, 1980.

[4] *Clean Air Act Amendments of 1990, Section 169B*, United States Congress. 42 U.S.C. 7492. Government Printing Office: Washington, D.C. November 15, 1990.

[5] *Recommendations for Improving Western Vistas*, Grand Canyon Visibility Transport Commission; Western Governors' Association: Denver, CO, June 10, 1996.

- The need to promote energy conservation, energy efficiency and renewable energy production;
- The need to track emissions growth that may affect air quality in clean air corridors;
- The need to manage emissions of stationary sources of sulfur dioxide with a voluntary program using emission reduction milestones coupled with a backstop cap-and-trade program that would be implemented if emissions reductions milestones were exceeded.
- The need to cooperate and work with federal land managers to do further studies of sources in and adjacent to Class I areas;
- The need to manage emissions of mobile sources through the implementation of more stringent national engine and fuel standards;
- The need to manage emissions of mobile sources from large urban areas that contribute significantly to visibility impairment in any of the 16 GCVTC Class I areas;
- The need to analyze the contribution of road dust emissions on visibility in the Class I areas;
- The need to promote programs to encourage emissions reductions in Mexico;
- The need to manage the visibility impacts resulting from the growth of emissions from prescribed fires needed to restore the ecosystem; and,
- The need to establish a successor organization to the GCVTC to oversee, promote, and support the GCVTC's recommendations.

1.7. Western Regional Air Partnership

The GCVTC's successor, the Western Regional Air Partnership (WRAP) was formed in September 1997. Though the WRAP's charter allows it to address any air quality issue of interest to WRAP members, its current work is focused on developing the policy and technical work products needed by states and tribes for regional haze SIPs or Tribal Implementation Plans (TIPs). Figure 1-1 shows the WRAP region.

The WRAP Board is composed of representatives from 13 states, 13 tribes, the US Department of Agriculture, the US Department of the Interior, and EPA. The WRAP operates on a consensus basis and conducts business through stakeholder-based technical and policy groups charged with assisting the development of regional haze work products. Additional information about the WRAP can be found at http://www.wrapair.org.

1.8. 1999 Regional Haze Rule

EPA proposed regional haze regulations in 1997.[6] The proposed regulations described a national program but did not include provisions to address the recommendations of the GCVTC. The Western Governors' Association (WGA) subsequently developed a recommendation related to the Colorado Plateau area and submitted it to EPA in June 1998.[7] Based on this and other comments, EPA issued the final regional haze rule in July 1999. In addition to the national program that could apply to any state or tribe and the final rule contained requirements for an optional program relying on the work of the GCVTC.[8]

1.9. 2002 Annex Rule for Stationary Sources of Sulfur Dioxide

One of the requirements of the RHR was the development and submission to EPA of a

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[6] *40 CFR Part 51 - Regional Haze Regulations; Proposed Rule - 62 FR 41138*. United States Environmental Protection Agency, Government Printing Office: Washington, D.C. July 31, 1997.

[7] Leavitt, M. O, Governor of Utah, Letter to EPA Administrator Browner on behalf of the Western Governors' Association, June 29, 1998.

[8] *40 CFR Part 51 - Regional Haze Rule; Final Rule, 64 FR 35714*. United States Environmental Protection Agency, Government Printing Office: Washington, D.C. July 1, 1999.

supplement or Annex to the GCVTC recommendations to define the program for stationary sources of sulfur dioxide by October 1, 2000. The WRAP established the Market Trading Forum (MTF) consisting of key stakeholders in the region to develop the Annex. The MTF analyzed the technical and policy issues surrounding the establishment of the voluntary emission reduction milestones with a backstop program to assure emission reductions were achieved and deliberated the content of the Annex.

Figure 1-1. Western Regional Air Partnership Region

The WRAP approved and submitted the Annex to the GCVTC recommendations to define a voluntary program of sulfur dioxide emission reduction milestones coupled with a backstop market-trading program to assure emission reductions on September 30, 2000. EPA proposed changes to the regional haze rule to incorporate the GCVTC Annex,[9] and the final rule was published in the Federal Register on June 5, 2003 (68 FR 33764).

1.10. 2003 Rule Change to Mobile Source Requirements for National Strategies

The GCVTC developed long-term projections of emissions in the GCVTC transport region based on information available in the early 1990's. Those emission projections showed that emissions from mobile sources were expected to decline through approximately 2005 and then begin to increase through 2040. As a result, the GCVTC recommendations included recommended actions for national strategies, that were out of the control of the GCVTC, and local strategies. The local strategies included the concept of capping emissions from mobile sources in large urban areas that contribute significantly to visibility impairment in any of the 16 GCVTC Class I areas in the year 2005, or some other year that emissions reached its minimum levels. This strategy was adopted in the RHR in 40 CFR 51.309(d)(5)(ii) and (iii).

After the RHR was adopted, EPA promulgated several new emission and fuel standards for mobile sources. Emission projections developed by the WRAP demonstrated emissions from mobile sources would decline significantly through the entire planning period from 2003 through 2018, and possibly beyond. Each pollutant was expected to decline except for sulfur dioxide from off-road mobile sources unless pending rule making for fuel standards were promulgated by EPA. Given the significant reduction in emissions, the WRAP determined that the current requirement under 40 CFR 51.309(d)(5)(ii) and (iii) were no longer an effective management tool for mobile sources, and developed proposed changes to the RHR to address emissions from mobile sources.

In 2003, the WRAP formally requested that EPA make revisions to the mobile sources section of the Regional Haze Rule (40 CFR 51.309(d)(5)) to reflect changes in emissions due to federal programs developed since the rule was promulgated in 1999. The basis for the WRAP request was EPA's adoption of more stringent national vehicle emission and fuel standard that result in mobile source emissions declining throughout the region during the 2003-2018 planning period covered by plans being submitted in December 2003. EPA proposed changes to 40 CFR 51.309(d)(5) on July 3, 2003 (68 FR 39842 and 68 FR 39888). EPA held a hearing on October 7, 2003, on the proposed change and promulgated the final rule on December 22, 2003 (68 FR 71009).

[9] *40 CFR Part 51 - Regional Haze Regulations; Proposed Rule, 67 FR 30418,* United States Environmental Protection Agency. Government Printing Office: Washington, D.C. May 6, 2002.

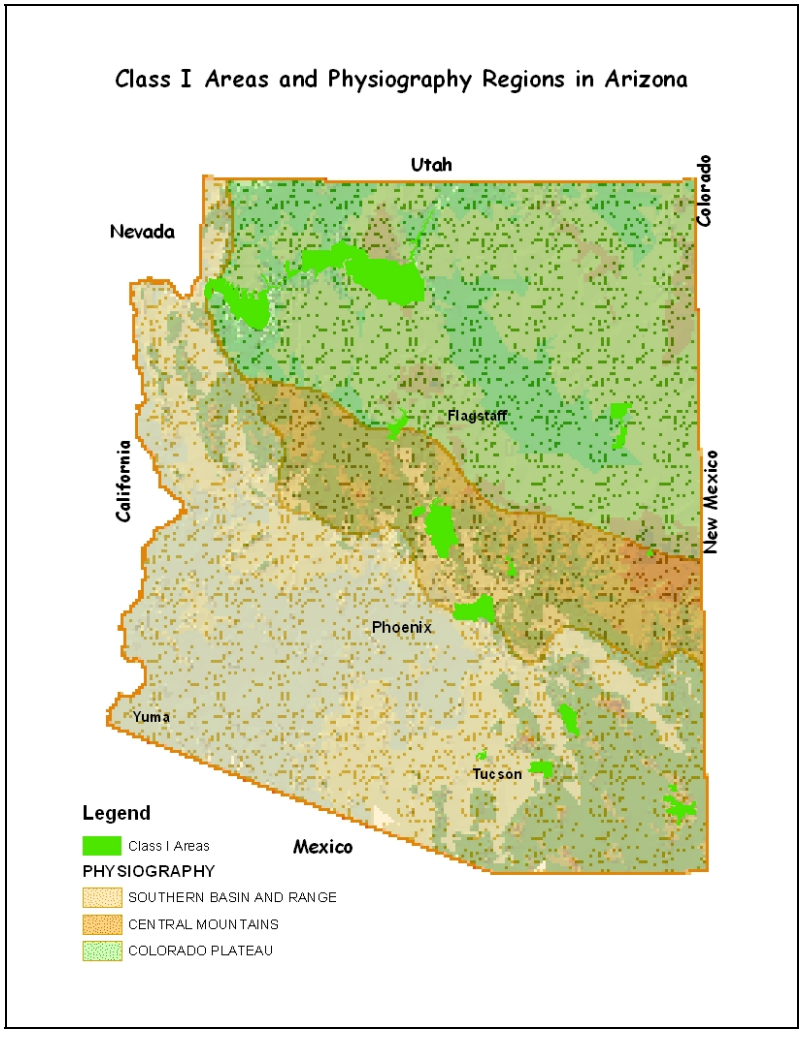
2. PHYSICAL, DEMOGRAPHIC, AND ECONOMIC DESCRIPTIONS OF ARIZONA

This section of the SIP provides an overview of the physical, demographic and economic characteristics, along with some history of the formation of the state. Appendix A-2a contains a bibliography of sources for the information presented in this chapter.

2.1. Climate and Physiography

Arizona encompasses nearly 114,000 square miles, ranging in elevation from 70 feet above sea level on the Colorado River at the Arizona-Mexico border, to 12,643 feet in the north at Humphreys Peak just north of Flagstaff. It contains four desert regions and hundreds of mountains, remnants of state's past volcanic activity. Arizona borders states of California and Nevada on the West, Utah on the North, Colorado to the Northeast, New Mexico on the East, and the country of Mexico to the South.

Figure 2-1. Class I Areas and Physiography Regions in Arizona



Arizona has three main topographical areas: 1) a high plateau in the northeast; 2) a mountainous region oriented southeast to northwest; and 3) low mountain ranges and desert valleys in the southwestern portion of the state. These regions bring a wide range of climate to the state with lows well below zero in the high plateau and mountainous regions of central and northern Arizona, while temperatures can exceed 125°F within the desert areas.

Precipitation throughout Arizona is governed by elevation and time of year, with the highest elevations averaging between 25 to 30 inches of precipitation annually. The desert southwest averages as low as three to four inches per year. The average number of days per year with measurable precipitation varies from near 70 days in the north (Flagstaff area) to 15 in the southwest (Yuma area). From November through March, storm systems from the Pacific Ocean cross the state, some bringing blizzard conditions to the high elevations. Summer rainfall begins early in July and usually lasts until mid-September. The moisture-bearing winds come from either the southwest (Gulf of California) or southeast (Gulf of Mexico), and during a wind shift called, "the North American Monsoon," large thunderstorms can occur in the mountainous regions on down through the central and southeastern portion of the state. Blowing dust prior to onset of rain can occur during these storms. Flash floods can also occur.

Approximately 70% of Arizona's land is owned and managed by the federal government and the 21 federally recognized Indian tribes. The state owns nearly 13%, leaving about 18% of the state land is under private ownership.

Arizona is host to some of the country's most spectacular and beloved national parks and wilderness areas. Of the 158 national parks and wilderness areas classified as mandatory Class I Federal areas, 12 are located in Arizona (40 CFR 81.403). Four of the 12 Arizona Class I areas are on the Colorado Plateau, the area of study by the GCVTC. A list of all 16 Class I areas that were part of the GCVTC study of Colorado Plateau Class I areas can be found in Chapter 3 of this SIP. Detailed information on Arizona's four Colorado Plateau Class I areas also can also be found in Chapter 3. Figure 2-2 shows Arizona Class I areas.

2.2. Population

The Arizona Territory was formed in 1863 from the western part of the New Mexico Territory.[10] As part of the New Mexico Territory in 1860, "Arizona County" had an 1860 population of 6,482. By 1870, Arizona Territory's population grew to 9,658 with most of the inhabitants living in Pima County. Arizona's population during the 2000 Census had grown to 5,130,632.

Arizona has six urbanized areas (i.e., 50,000 people or more), two of which are major urban areas (i.e., 250,000 people or more), and three represent newly qualified areas based on the results of the 2000 Census (see Table 2-1). Two of these urbanized areas, Flagstaff and Prescott, are located in northern Arizona. Flagstaff is in Coconino County near two of the four Class I areas: Grand Canyon National Park and Sycamore Canyon Wilderness.

[10] Arizona was the name given to the territory. The town of Arizona actually was located south of the new border in Sonora, Mexico. The old name of the region was 'Pimería Alta.' The Treaty of Guadalupe Hidalgo in 1848 ended the war between the U.S. and Mexico. The treaty required Mexico to cede hundreds of thousands of square miles of land to the U.S. The geographical areas included western New Mexico, Arizona north of the Gila River, California, Nevada, Utah, as well as parts of Colorado, Wyoming, Kansas, and Oklahoma. Then, in 1853 with the Gadsden Purchase, which added the land south of the Gila River, Arizona formed its present borders.

Figure 2-2. Counties and Class I Areas in Arizona

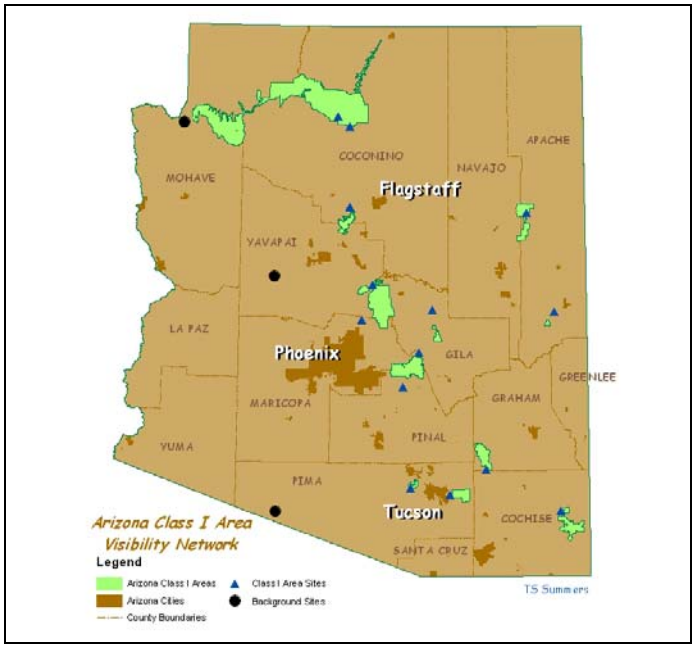


Table 2-1
Arizona's Urbanized Areas: Census 2000

Urbanized Areas	Arizona County	Population
Avondale	Maricopa	67,875
Flagstaff	Coconino	57,050
Phoenix-Mesa	Maricopa	2,907,049
Prescott	Yavapai	61,909
Tucson	Pima	720,425
Yuma (AZ-CA)	Yuma	94,950

Source: U.S. Bureau of the Census

Table 2-2 shows Census 2000 county populations as well as 2002 mid-year county population estimates for Arizona. According to these data, the state grew 6.7 percent between 2000 and 2002. The two largest Metropolitan Statistical Areas (MSAs), Phoenix-Mesa and Tucson, grew at 7.3 percent and 5.5 percent, respectively, during these two years. The Phoenix-Mesa MSA includes Maricopa and Pinal Counties. Pinal County was added to the Phoenix-Mesa MSA in 1993.

Table 2-2
Growth of Arizona's Counties: 2000-2002

County	Census 2000 (April)	2002 Estimate (July)
Apache	69,423	70,105
Cochise	117,755	124,040
Coconino	116,320	125,420
Gila	51,335	53,015
Graham	33,489	34,070
Greenlee	8,547	8,605
La Paz	19,715	20,365
Maricopa*	3,072,149	3,296,250
Mohave	155,032	166,465
Navajo	97,470	101615
Pima (Tucson MSA)	843,746	890,545
Pinal*	179,727	192,395
Santa Cruz	38,381	39,840
Yavapai	167,517	180,260
Yuma	160,026	169,760
State Total	5,130,632	5,472,750

* Part of Phoenix-Mesa Metropolitan Statistical Area
Source: U.S. Bureau of the Census; Population Statistics Unit, Research Administration, Department of Economic Security, December 6, 2002.

The Phoenix-Mesa MSA ranks 14th among all metropolitan areas by total population for 2000. However, the Phoenix-Mesa MSA is one of the fastest-growing metropolitan areas in the nation. As a county, however, Maricopa County gained the most number of people numerically, ranking it as the fourth largest county in the nation.

Table 2-3 portrays population projections for selected areas in Arizona including the Phoenix-Mesa MSA and Tucson MSA in five-year increments from 2000 to 2020. The county population projections for the four counties where the Arizona Colorado Plateau Class I areas are located and the projected state totals also are included for reference.

Table 2-3
Population Projections for Selected Arizona MSAs and Counties: 2000-2020

Area	2000	2005	2010	2015	2020
Phoenix-Mesa-Scottsdale MSA	3,115,787	3,511,048	3,909,281	4,317,999	4,747,319
Tucson MSA	854,329	943,795	1,031,623	1,119,342	1,206,244
Apache County	67,925	72,236	76,645	81,173	85,766
Coconino County	123,329	135,595	147,352	158,753	169,343
Mohave County	147,529	171,504	194,403	215,988	236,396
Navajo County	88,898	94,395	99,979	105,843	111,946
Yavapai County	152,966	175,693	198,052	219,614	240,849
State Total	4,961,953	5,553,849	6,145,108	6,744,754	7,363,604

Source: Population Statistics Unit, Research Administration, Department of Economic Security (DES), Approved by Director August 1, 1997.

According to these projections, the state's population is projected to grow by 48 percent in 20 years. While these are the official population projections for the State, they are under estimates. The 2000 projection is 4.2% below the 2000 official U.S. Census count and the decennial growth rates for 2000 through 2010 and 2010 through 2020 are 20% and 10%, respectively.

If the average decennial growth rate of 40 percent from 1960 through 2000 is maintained, Arizona's population in 2010 would almost be equivalent to the 2020 DES population projection. Carrying the 40 percent decennial growth rate forward to 2020 would mean a state population of about 10 million compared to the 7.3 million projected in 2020 by DES.

2.3. Economy

Arizona's growth in gross state product ranked first in the nation during 1992 through 1999, increasing from $85 billion in 1992 to $140 billion in 1999. Contributing to this growth were high-tech manufacturing industries, wholesale and retail trade, services, and construction industries.[11] Manufacturing output averaged 13.2 percent annually during this eight-year time period. The other sectors grew predominantly as the population of the state grew.

Table 2-4 shows a time series of civilian non-farm labor force data. The last column shows the annual average growth rate in employment between 1990 and 2001. Total non-farm and private employment grew at rates over 50%. By contrast the minimum decennial growth rate for 1960 through 2000 was 35%. Figure 2-3 shows the change in employment from 1990 through 2001. It should be noted that reliable data for agricultural employment are not available due to large seasonal fluctuations in employment.

[11] Based on construction data through the 1990s, it is evident that the single family housing sector was a major force, coupled with the commercial sector, behind the state's construction and real estate industries.

Table 2-4
Average Number of Non-Farm Employees in Arizona 1990-2001 (10,000s)

Year	1990	1992	1994	1996	1998	2000	2001	Annual Avg. Growth
Goods	27.33	26.22	30.35	34.69	37.30	38.78	38.48	4.1%
Services	120.98	125.49	138.86	154.54	170.18	185.49	188.01	4.0%
Total Non-Farm	148.31	151.71	169.20	189.23	207.47	224.27	226.50	3.9%
Private	122.41	124.03	139.77	157.44	173.32	187.61	188.72	3.2%

Source: Arizona Department of Economic Security in cooperation with U.S. Department of Labor, Bureau of Labor Statistics.
* Percent change between 1990 and 2001.

Figure 2-3. Non-Farm Employment in Arizona: 1990-2001

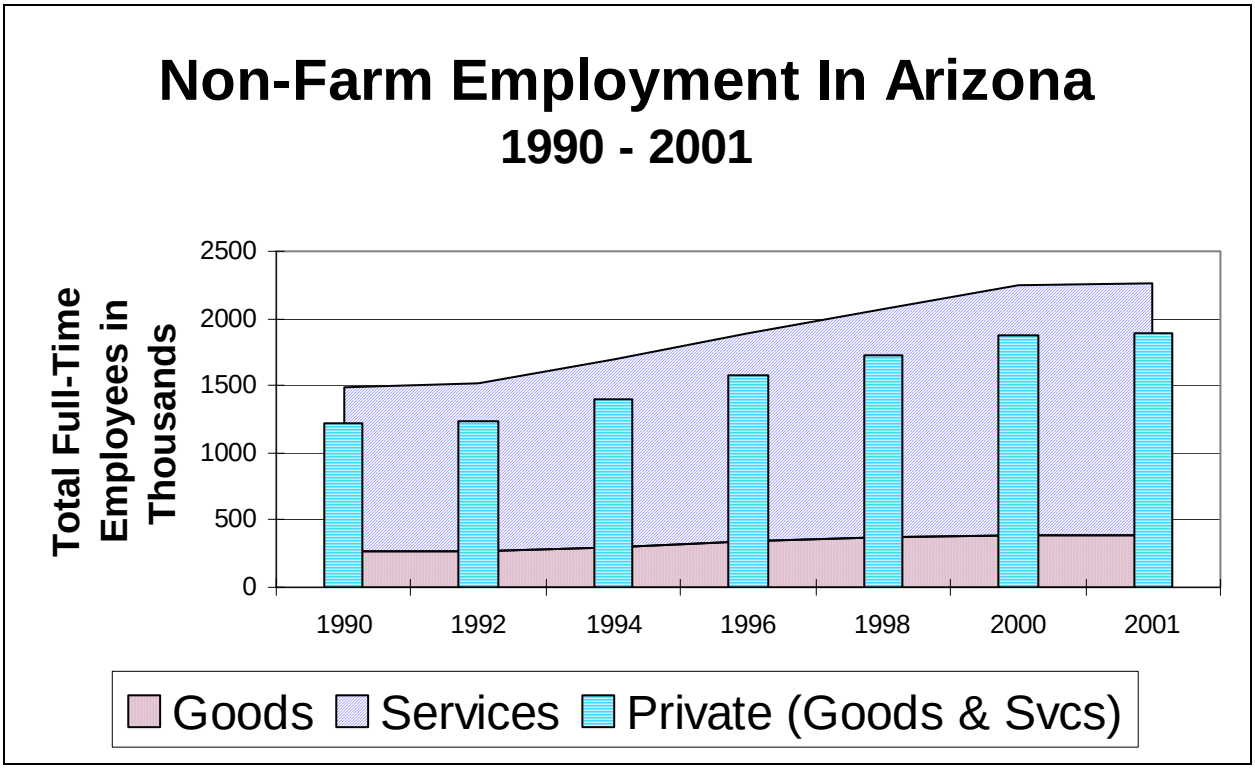


Table 2-5 contains selected economic indicators forecast for Arizona for 2001 through 2005. All indicators are forecast to increase except for mining, manufacturing, and TCPU. The forecast largest gains are for personal income (27.9%), restaurant and bar sales (26.0%), retail sales (19.8%), food sales (17.9%), and services (16.7%).

Table 2-5
Projected Economic Indicators for Arizona: 2001-2005

Economic Indicator	2001	2002	2003	2004	2005
Personal Income ($millions)	137,313.5	143,291.1	150,549.4	161,338.3	175,570.2
Retail Sales ($millions)	55,421.2	55,928.2	58,288.5	61,477.6	66,369.8
Food Sales ($millions)	7,262.7	7,491.3	7,678.3	8,050.4	8,565.3
Restaurant & Bar Sales ($millions)	6,360.6	6,490.3	6,851.4	7,367.4	8,014.0
Gasoline Sales ($millions)	3,492.3	3,476.4	3,693.4	3,717.5	3,845.0
Total Employment (10,000s)	226.63	224.74	229.23	238.10	248.87
Mining (1,000s)	9.6	8.8	8.7	8.5	8.3
Construction (1,000s)	164.9	159.4	161.6	160.8	166.6
Manufacturing (1,000s)	210.1	194.0	188.8	193.0	204.4
TCPU (1,000s)**	110.7	105.6	105.1	107.5	110.4
Trade (1,000s)	533.2	537.2	547.8	570.8	594.9
FIRE (1,000s)***	150.7	149.9	155.1	164.4	173.2
Services (1,000s)	711.1	707.3	736.8	783.5	829.7
Government (1,000s)	376.4	385.3	388.6	392.7	401.2
Unemployment Rate	4.7%	5.7%	5.2%	4.4%	4.1%

Source: *Economic Outlook 03/04*. The University of Arizona. Eller College of Business and Public Administration, Table 3.

* Includes bar sales as well

** Transportation, Communication, and Public Utilities

*** Finance, Insurance, and Real Estate

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3. MANDATORY CLASS I FEDERAL AREAS ON THE COLORADO PLATEAU

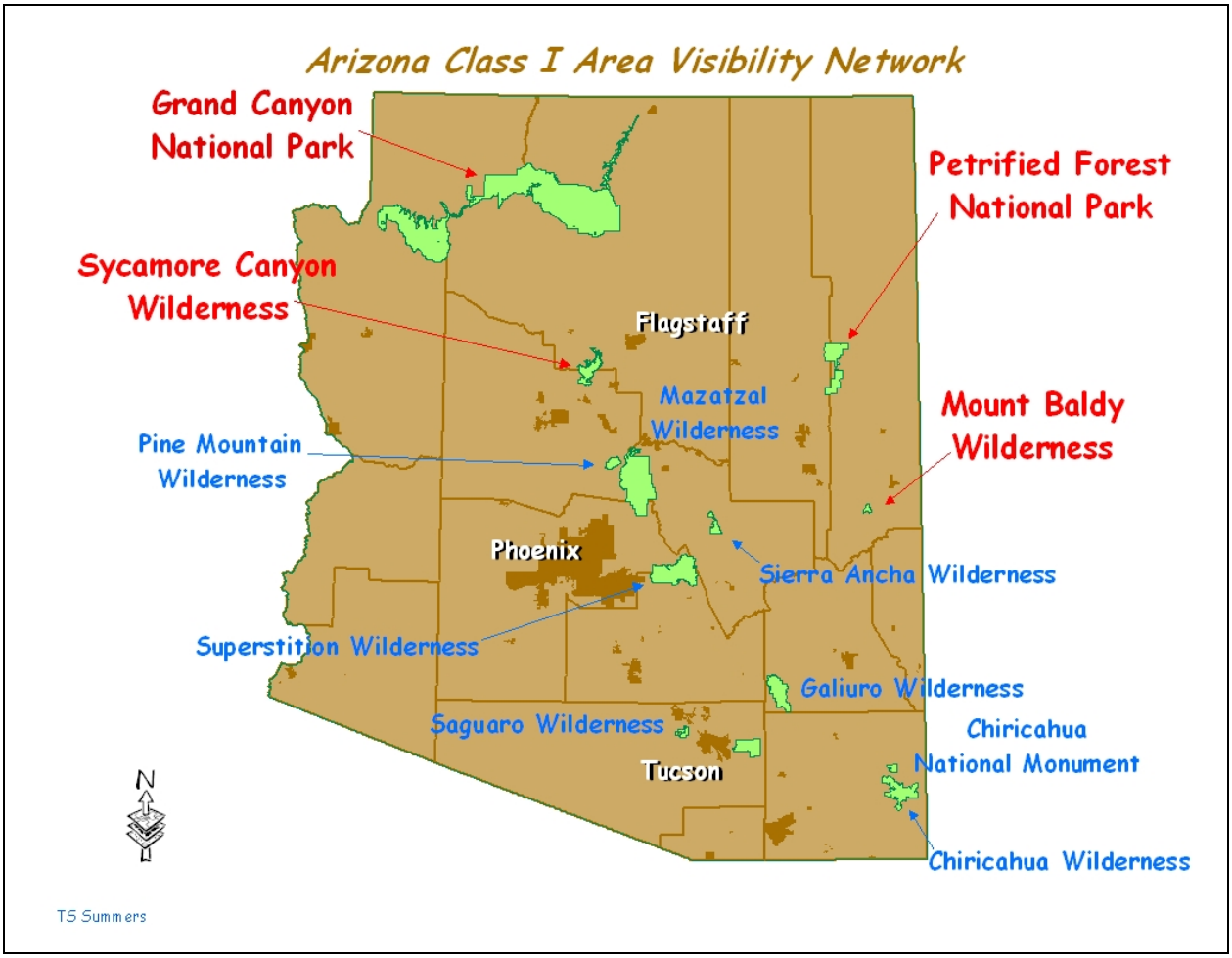
This chapter describes the 16 Class I areas on the Colorado Plateau studied by the Grand Canyon Visibility Transport Commission and addressed in this SIP in response to 40 CFR 51.309. Figure 3-1 shows the location of the national parks and wilderness areas addressed by this SIP.

Figure 3-1. Colorado Plateau Class I areas

3.1. Arizona Class I Areas

There are a total of 12 mandatory Class I Federal areas in Arizona. Of the four Arizona Class I areas addressed by this SIP, two, Grand Canyon National Park and Sycamore Canyon Wilderness are located in the northwestern portion of the state. Grand Canyon National Park extends over toward the state's western border with Nevada, and Sycamore Canyon Wilderness Area is located south of Flagstaff. The third Class I area, Petrified Forest National Park, occupies land adjacent to and directly south of the Navajo Reservation. The fourth, Mt. Baldy Wilderness Area, occupies a comparatively small portion of land on the eastern side of the state and is one of the many extinct volcanoes found throughout the state. All four of these Arizona Class I areas are part of a larger formation known as the Colorado Plateau. This high, semi-arid tableland includes, along with northern Arizona, southeast Utah, northwest New Mexico, and western Colorado.

Figure 3-2. Arizona Class I Areas.



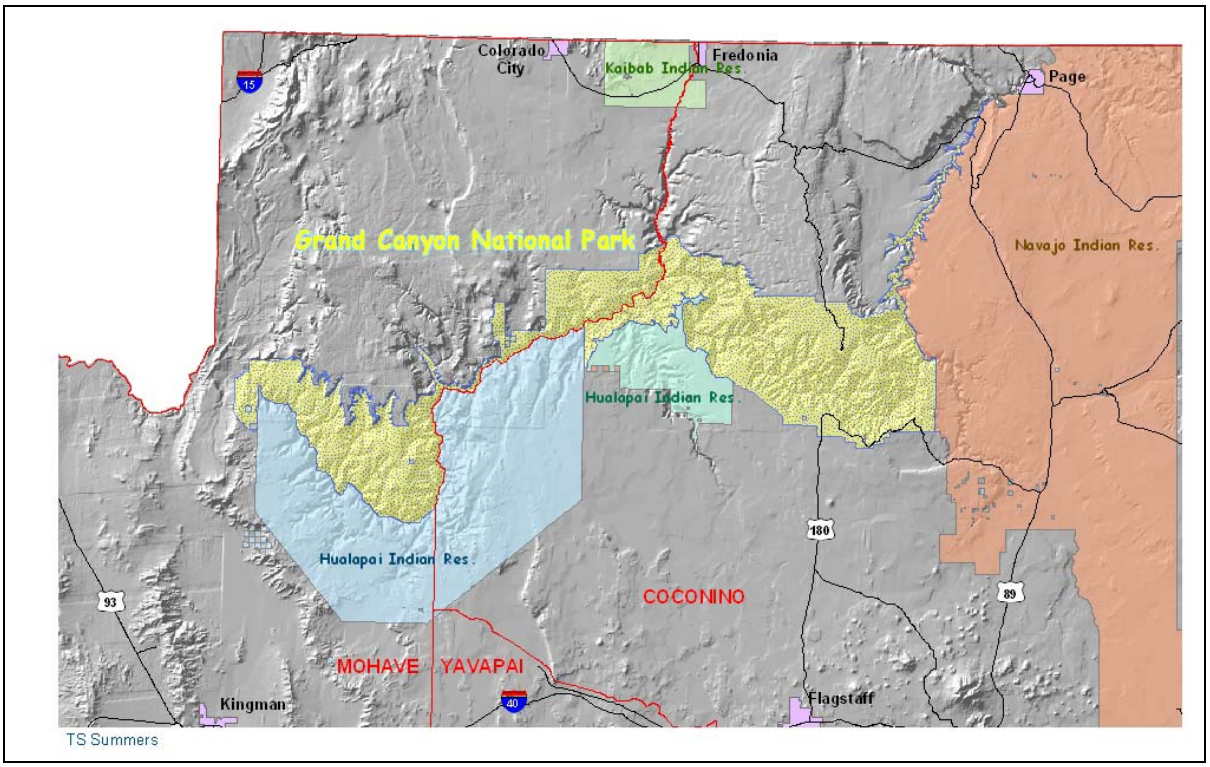
3.1.1. Grand Canyon National Park

The Grand Canyon National Park is on the southwestern Colorado Plateau. Over time, the Colorado River and its tributaries cut through the many layers of rock that make up the southwestern Colorado Plateau, forming a gorge one-mile deep and several miles wide. This cut into the earth begins at Lees Ferry, below Glen Canyon Dam, and extends 277 miles with a variation in width from 10-18 miles wide to just hundreds of yards in Marble Canyon to the northeast. The western part of the canyon extends into the Mohave Desert, while the eastern part reaches into the Great Basin Desert.

The Park, after being designated a national monument in 1908, became a national park on February 26, 1919. The Park is contained within Mohave and Coconino Counties. The Grand Canyon was designated a World Heritage Site in 1979. The Grand Canyon is a spectacular example of weathering and erosion, featuring unmatched vistas and intriguing landforms comprised of irregular-shaped cliffs and valleys caused by differential erosion, buttes, mesas, and rock depositions forming talus cones and aprons. Because of these geological spectacles, the Grand Canyon ranks among the world's greatest attractions with on-going erosion revealing much about the earth's geological history. Every year millons of visitors from all over the world visit the Park.

Figure 3-3. View From South Rim of The Grand Canyon National Park

Figure 3-4. Map of Grand Canyon National Park Area

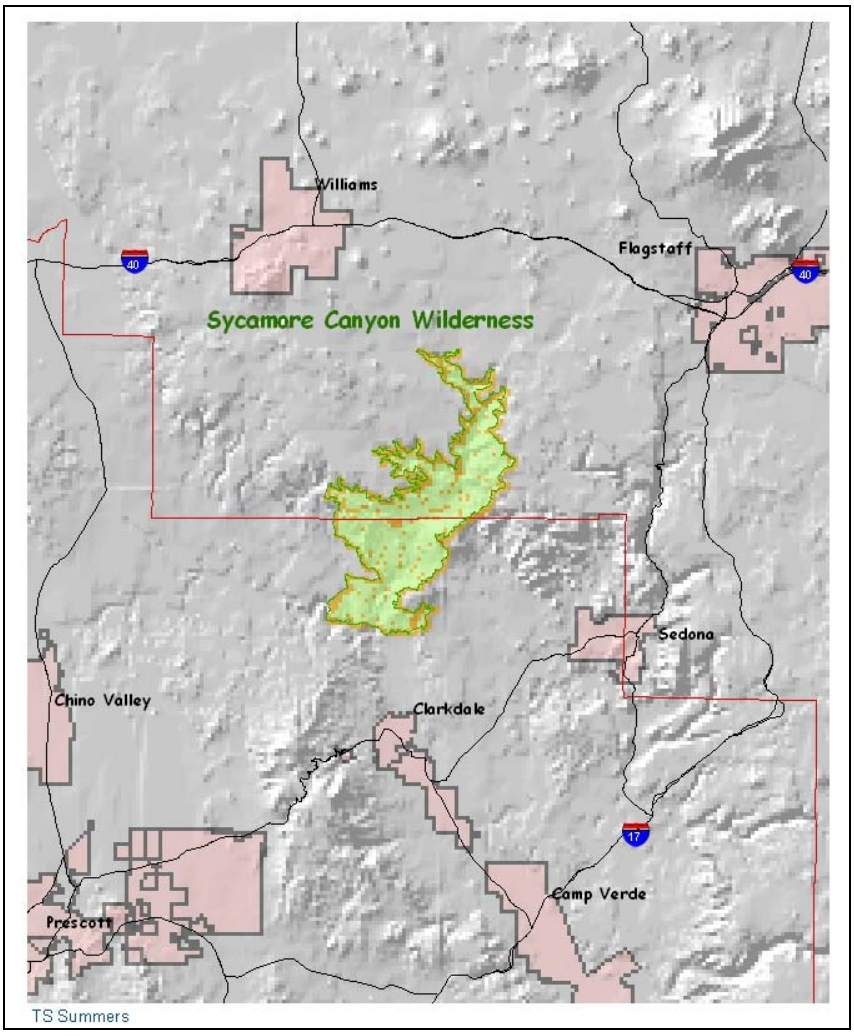


3.1.2. Sycamore Canyon Wilderness

Approximately 40 miles southwest of Flagstaff is the Class I Area known as Sycamore Canyon Wilderness. Designated in 1935 as a Primitive Area, Congress formally established the area as a federally protected area in 1972. It became a Wilderness Area through the 1977 Arizona Wilderness Act.

The area, split between Coconino and Yavapai Counties, contains 55,937 acres, beginning with pine and fir forests on the Colorado Plateau through part of the Mogollon Rim, ending at the desert mouth of the Verde Valley. Sycamore Canyon Wilderness, containing beautiful red rock, buttes, and sheer cliffs, is only 15 miles west of Oak Creek Canyon and Sedona area, one of Arizona's most popular tourist destinations. Motorized or mechanized vehicles are not allowed in the area.

Figure 3-5. Map of Sycamore Canyon Wilderness Area

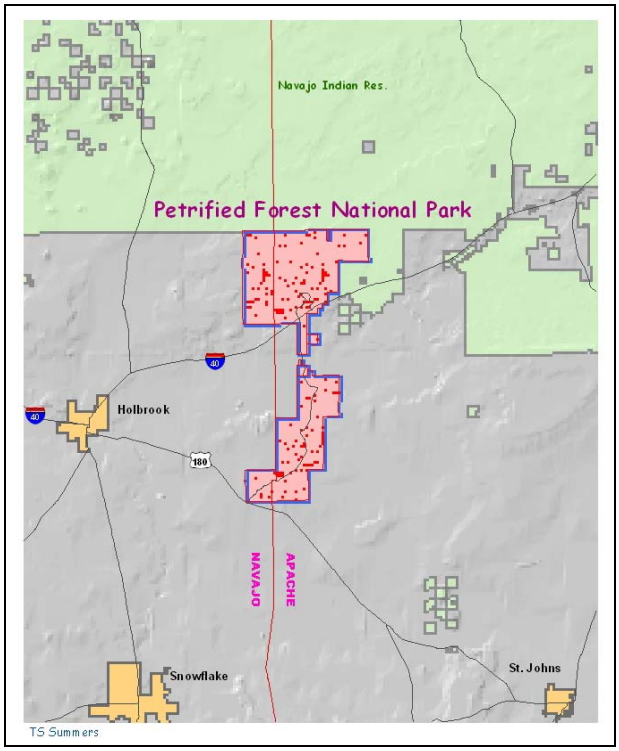


3.1.3. Petrified Forest National Park

Petrified Forest National Park is located in northeastern Arizona. The Park lies within both Navajo and Apache Counties, covering a total of 93,533 acres. It was designated a national monument in 1906 and a national park in 1962. The southern portion of Petrified Forest National Park contains one of the world's largest concentrations of petrified wood. The northern portion of the Park encompasses the badlands of the Chinle Formation that extends along the Little Colorado River valley to the west for about 125 miles. Known more commonly as "the Painted Desert" with its colored soils ranging from blues and reds to yellows and grays, this area includes at its southern tip, the Rainbow Forest

Figure 3-6. Petrified Forest National Park

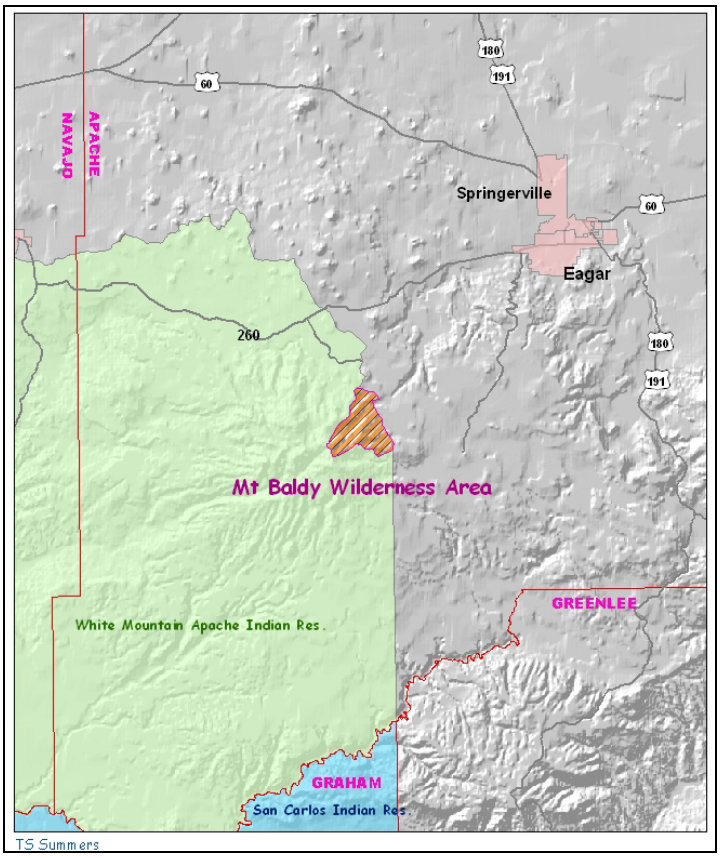
Figure 3-7. Map of Petrified Forest National Park Area



3.1.4. Mt. Baldy Wilderness

Not to be confused with California's Mt. Baldy, located in the San Gabriel Mountains, Mt. Baldy Wilderness, located in Apache County about 90 miles south of the Petrified Forest National Park. Mt. Baldy Wilderness, 7,079 acres, is an ancient volcano and the second highest peak in Arizona. It is located in the White Mountains along the southern edge of the Colorado Plateau. The summit of Mt. Baldy is on the White Mountain Apache Indian Reservation and is closed to all non-tribal members. This SIP is only for the portion of Mt. Baldy under the jurisdiction of the State.

Figure 3-8. Map of Mount Baldy Wilderness Area



Four rivers have headwaters on the slopes of Mt. Baldy: the Black, Blue, White, and Little Colorado rivers. Fishing and camping are major recreational activities where 25 lakes are scattered among the mountains. Livestock grazing is common on the meadows and pine forests of the White Mountains. The area has a wide range of weather, with snow at the higher elevations.

The same conditions and restrictions that pertain to the Sycamore Canyon Wilderness Area also pertain to Mt. Baldy Wilderness area – no motorized or mechanized vehicles, no bicycles, and no power equipment is allowed.

3.2. Class I Areas Outside Arizona

The four Class I areas on the Colorado Plateau are joined by 12 other Class I areas to make up the total of 16 Class I areas originally examined by the GCVTC. A brief description of each of these 12 areas follows.[12]

Capitol Reef National Park, Utah – Capitol Reef received its name from the barrier created by a 100 mile long ridge of rock that was thrust up from the earth millions of years ago. The rock is said to resemble the dome-like structures seen on capitol buildings in Washington, D.C. The park is fairly isolated in the south central part of Utah, 60 miles south of I-70.

Bryce Canyon National Park, Utah – Also in southern Utah, Bryce Canyon represents the effect of centuries of erosion that has shaped the colorful Claron limestones, sandstones, and mudstones of this park into thousands of spires, pinnacles and mazes. The local name for these shapes is "hoodoos," one of which forms a natural amphitheatre along the eastern edge.

Zion National Park, Utah – On the southern edge of the Colorado Plateau, Zion is known for its highly variable weather due to its elevation changes of 3,666 feet at its lowest point in Coalpits Wash to 8,726 feet at its highest, Horse Range Mountain in the Kolob Canyon section. The variable weather an elevations have led to numerous "microenvironments" that range from hanging gardens to isolated mesas.

Arches National Park, Utah - Arches National Park contains over two thousand natural sandstone arches, including the famous Delicate Arch. The park, also known for its balanced rocks and pinnacles, is located near Moab, Utah. Protected since 1929, it became a national park in 1971.

Canyonlands National Park, Utah – Canyonlands preserves one of the last, relatively undisturbed areas of the Colorado Plateau. It contains a large portion of the Colorado River and its tributaries, which carve out numerous canyons and gorges. The unique desert ecosystem has been visited by different groups of settlers for over 10,000 years, in concert with available resources. Its national park designation in 1964 is an attempt to maintain its natural beauty while still allowing for continued visitors.

Mesa Verde National Park, Colorado – Spanish for "green table," Mesa Verde allows visitors to experience both cultural and physical influences on the land. From approximately 600 A.D. through 1300 A.D., settlements flourished in stone villages throughout the alcoves of the canyon walls. Twenty-four tribes in the southwest have ancestral affiliation with the sites at Mesa Verde. The park is 35 miles west of Durango in southwestern Colorado, just off US Highway 160.

Flattops Wilderness Area, Colorado – Flattops has a less friendly history than Mesa Verde, witnessing the "Meeker Massacre" of 1879 when federal troops forcibly removed the Ute Indians, who had resided in the area for perhaps thousands of years. Originally destined to become a summer home area, it was instead recommended for wilderness area designation in 1919. In fact, Flattops became the keystone in the establishment of the National Wilderness Preservation System.

Maroon Bells Wilderness Area, Colorado – Maroon Bells, and its neighboring area, Snowmass, see a large amount of visitors every year. There are over 100 miles of trail, and despite peaks that rise above 14,000 feet, people literally swarm throughout the park's over 181,000 acres to enjoy some of the most beautiful views, some say of wildflowers alone, in the country. The park is named not for a flower, but

[12] The State of Arizona thanks the USDA and US Park Service for providing information on the national parks and wilderness areas that comprise the Colorado Plateau through its various web sites and literature.

for Maroon Bells peak, one of the most photographed mountains, especially when it is reflected in Maroon Lake.

West Elk Wilderness Area, Colorado – As busy as Maroon Bells Wilderness Area is with visitors, West Elk is fairly devoid of people. Only hunters populate the area in the fall, when elk and deer number in the thousands. Long lava flows are found throughout the area, where trails can lead to areas containing ridges that the wind and water have carved into formations that resemble the turrets of castles.

Black Canyon of the Gunnison Wilderness Area, Colorado – The Black Canyon of the Gunnison's unique and spectacular landscape was formed slowly by the action of water and rock scouring down through hard Proterozoic crystalline rock. No other canyon in North America combines the narrow opening, sheer walls, and startling depths offered by the Black Canyon of the Gunnison.

Weminuche Wilderness Area, Colorado – Weminuche is Colorado's largest wilderness area. It contains 63 high altitude lakes, known for their deep blue color. The area encompasses a total of 488,210 acres that include the headwaters of both the Rio Grande and San Juan Rivers. The area also contains the Continental Divide Trail and is said to exemplify the mission of the Wilderness Act of 1964 by securing the benefits of an enduring resource of wilderness for generations to come.

San Pedro Parks Wilderness Area, New Mexico – This area, at the same latitude as the Grand Canyon National Park where the Colorado Plateau dips into New Mexico and Arizona, has an elevation of 10,000 feet above sea level. But unlike its counterpart in Arizona, the area has rolling mountaintops and meadows with large grassy areas. The area sees frequent rain in late summer and snow by November. Its mountain streams are a favorite of local trout anglers.

4. TECHNICAL BASIS FOR REGULATION OF REGIONAL HAZE

This chapter provides a brief introduction to the science of visibility and the technical basis for the regulation of regional haze. A more detailed presentation of the concepts contained in this chapter can be found in the 1999 document entitled *Introduction to Visibility* by William C. Malm, Ph.D., available from CIRA (Cooperative Institute for Research in the Atmosphere) at Colorado State University.

4.1. How Do We See?

Light waves, like radio waves, are a form of electromagnetic radiation. All electromagnetic radiation travels in the form of waves at the speed of light which is approximately 186,000 miles per second. Light waves, like radio waves, also have distinct frequencies (the number of times per second the wave goes from crest to crest) and a corresponding wave length (the distance between the crest of each wave). As an example, when you tune your radio to 550 on the AM dial, your radio receives a signal that has a frequency of 550 thousand cycles per second with a corresponding wave length of approximately 1,800 feet (six football fields). In contrast, blue light has a frequency of about 3.5 trillion cycles per second corresponding wave length of 1.5 millionths of an foot. Unlike radio waves that require humans to use a radio receiver to capture information, the human eye directly captures information contained in light waves.

Light waves are made up of small energy packets, or photons, that travel through the air. Light photons each have a defined energy level that give them a distinct color corresponding to its frequency or wave length. Red light waves are at the lowest energy level and the longest wavelength. Blue light waves are at the higher energy level and shorter wavelength. White light, like sunlight, is made up of a mixture of all of the different wave lengths of light. When white sunlight goes through a prism, or through rain drops, the photons can be separated by energy level and generate a rainbow of colors. The human eye is a sophisticated receiver of electromagnetic radiation in the form of light. Unlike a radio receiver that can only detect and interpret one frequency at a time, the human eye can detect all frequencies, or wavelengths, of visible light simultaneously.

The human eye can distinguish a wide variety of colors and light intensities of objects. In order to distinguish an object from its background, there must be a contrast between the object and its background. The contrast necessary to distinguish an object from its background varies depending on color and texture, but generally, a 2% contrast is necessary in order to be detected by the human eye.

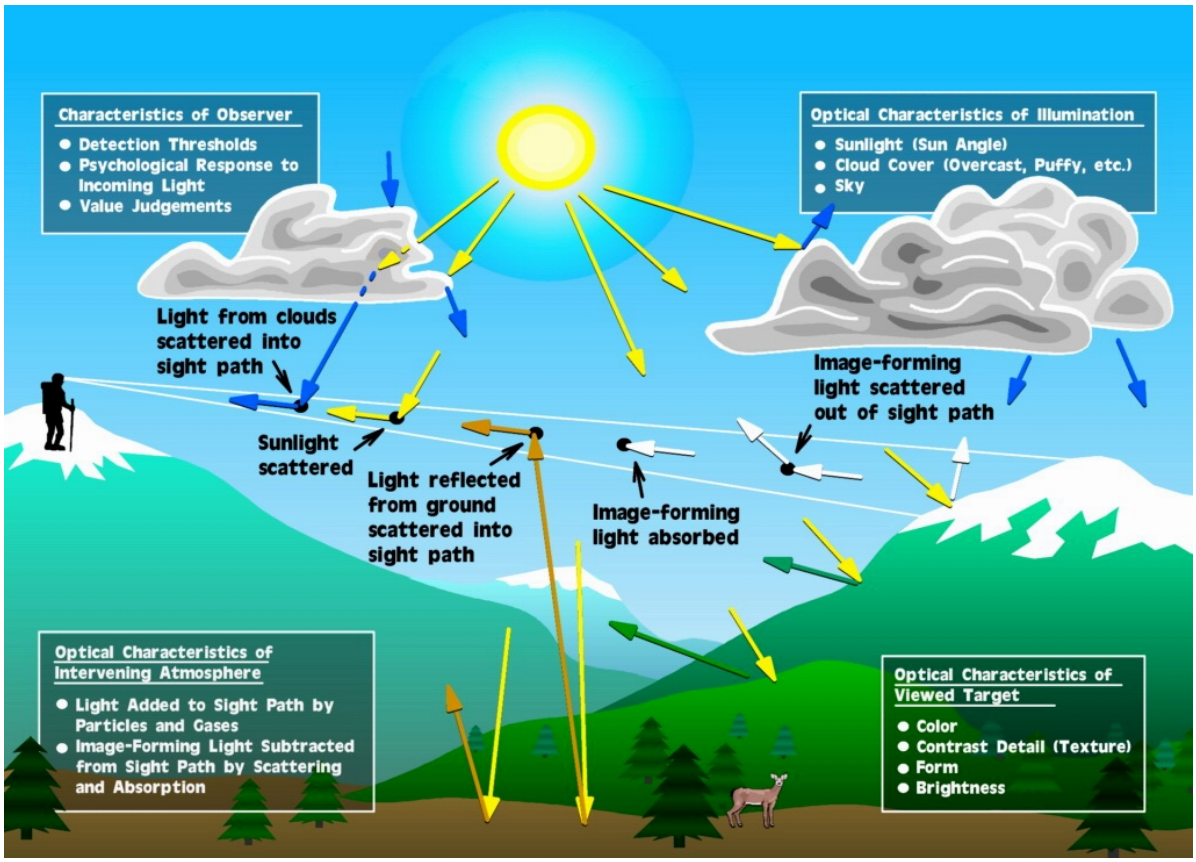
When sunlight hits a solid object, the surface absorbs some photons and reflect others. The wavelength of the light reflected defines the color that the human eye perceives. For example, the reason an apple looks red is that red photons are mostly reflected, and photons in the other color wavelengths are mostly absorbed. An egg looks white because the surface absorbs and reflects all of the color components of light at about the same level.

Sunlight reflected from surfaces on the earth, or scattered by particles and gases in the air, interfere with the view that would be experienced under ideal conditions. Gases and very small particles preferentially scatter blue light in all directions. Large particles tend to scatter all colors of light (white light) in the forward direction. This causes a very strong white haze to appear to the eye when looking toward the sun, and much lighter haze when looking away from the sun.

4.2. How Particulates and Gases Impair Visibility

As light photons travel through the air, they collide with molecules of gases and particles. This collision results in the light photons either being scattered or absorbed. When sunlight travels through clear air (i.e., with no particles), light photons corresponding with the higher energy level blue wavelengths of light are preferentially scattered, resulting in the human eye perceiving the sky as being blue, even though air is a colorless gas. Figure 4-1 shows how particles and gases interact with light.

Figure 4-1. Interaction of Particles and Gases with Light.



There is a limit to how far the eye can see. That limit is defined by the rate at which light is extinguished (scattered or absorbed) as it travels through the air. The light extinction coefficient defines the rate at which light is removed as it travels through the air. In clear air (i.e., with no particles in the air), that limit is approximately 350 kilometers and results from Rayleigh scattering caused by light encountering molecules of oxygen and nitrogen in clear air. This corresponds to a light extinction coefficient of approximately 10 inverse mega-meters (10 Mm^{-1}).

Particles in the air, which are also referred to as aerosols, also interfere with light as it travels, especially particles that are approximately the same size as the wavelength of light. As light travels, light photons will be scattered and absorbed by particles in the air. A higher concentration of particles in the air will result in a higher light extinction coefficient and more visibility impairment.

Different types of particles have different effects on visibility. For visibility studies, concentrations of particles in the air are expressed in millionths of grams (micrograms) per cubic meter of air. Filters are used to collect the particles for laboratory analysis. The equipment used to collect the

filters separate the particles by size. Some filters only collect fine particles that are smaller than 2.5 microns in diameter, while others collect both fine particles and courser particles smaller than 10 microns in diameter. Light extinction efficiencies are used to convert the concentration of particles in the air into the impact on the light extinction coefficient. As was noted above, smaller particles are more efficient at scattering light than larger particles.

4.3. Types of Particles and Gases Contributing to Visibility Impairment

There are two distinct categories of particles in the air: primary particulates that are directly emitted into the air, and secondary particulates that are formed by the chemical reaction of gases emitted into the air. Primary particulates include course soils, fine soils, elemental carbon (soot), and organic carbon. Secondary particulates include ammonium sulfate formed from gaseous sulfur dioxide, ammonium nitrate formed from gaseous oxides of nitrogen, and also organic carbon particles formed from volatile organic carbon gases. An additional factor that effects visibility is that ammonium sulfate and ammonium nitrate particles also can absorb moisture in the air causing the particles to grow, which increases light extinction.

For regional haze visibility assessment studies, Table 4-1 summarizes the particles of interest, light extinction efficiencies, and the effect of relative humidity on the extinction efficiencies for ammonium sulfate and ammonium nitrate particles.

Table 4-1. Light Extinction Efficiencies of Particles

Type of Particle	**Light Extinction Efficiency & Effect of Relative Humidity (RH)**		
Relative Humidity	**30% RH**	**60% RH**	**90% RH**
Humidity Dependent			
Ammonium Sulfate	3.0	4.8	11.4
Ammonium Nitrate	3.0	4.8	11.4
Humidity Independent			
Organic Carbon	4.0	4.0	4.0
Elemental Carbon	10.0	10.0	10.0
Fine Soil	1.0	1.0	1.0
Coarse Soil	0.6	0.6	0.6

Source: EPA Visibility Monitoring Guidance EPA-454/R-99-003. Humidity effects derived from Figure 2-3. Light Extinction Efficiencies are expressed in units of square-meters per gram.

The key concepts to understand from Table 4-1 are:

- The extinction efficiency varies widely depending on the type of particle. For instance, elemental carbon, which not only scatters light but also absorbs light has 16.7 times the influence on visibility than coarse soil.
- Relative humidity is important if ammonium sulfates or ammonium nitrates are present. At high relative humidity the extinction efficiency can be a factor of 4 higher than under low relative humidity.
- Understanding of the composition of the particles present in the atmosphere is necessary to accurately characterize the impact on visibility.

4.4. Sources of Particulates and Gases Contributing to Visibility Impairment on the Colorado Plateau

Sources of emissions that contribute to the particles in the atmosphere that cause visibility impairment fall into two broad classes: natural sources of emissions, and human-caused (or anthropogenic) sources of emissions. The GCVTC developed comprehensive emission inventories for areas contributing to visibility impairment at the 16 GCVTC Class I areas on the Colorado Plateau.

Natural sources of emissions include a wide variety of pollutants that are emitted to the atmosphere. Wildfire emissions include primarily fine particulates (organic carbon, elemental carbon, and fine soils), course soils, oxides of nitrogen, and volatile organic compounds. Volcanic activity produces fine and course soils, and in many instances, sulfur dioxide. High winds can create emissions from natural undisturbed lands that contain primarily coarse and some fine soils. Achieving visibility conditions comparable to those that would be experienced with only natural sources is the long-term goal of the regional haze program.

Human-caused sources of emissions also contribute to visibility impairment. Point sources (such as utility boilers, smelters, industrial boilers, and refineries) produce the majority of the sulfur dioxide in the GCVTC region, and about 25% of the oxides of nitrogen. Mobile sources (such as cars, trucks, off-road equipment, trains, and planes), produce the majority of the oxides of nitrogen in the GCVTC region and half of the human-caused volatile organic carbon emissions. In addition to direct emissions from mobile sources, road dust can be an important source of course and fine soil emissions. Prescribed fire on wildlands produce emissions similar to natural occurring wildfires. Finally, area sources (which make up all the other source types not discussed above) generate a broad range of emissions of all pollutants of interest for visibility and can be important especially in large population centers. States are required to develop long-term strategies to manage human-caused sources of visibility impairment to make reasonable progress toward the national goal of eliminating human-caused visibility impairment.

4.5. Visibility Conditions on the Colorado Plateau

The Colorado Plateau generally has the best visibility conditions in the country. Unlike the eastern United States where ammonium sulfates are the most significant contributor to visibility impairment, there is no one type of particle that is the most significant contributor on the Colorado Plateau. The GCVTC found that particle based visibility impairment results equally from ammonium sulfates, the combination of organic carbon and elemental carbon, and the combination of coarse and fine soils. The GCVTC found that ammonium nitrate is a relatively small contributor to visibility impairment on the Colorado Plateau. On a day-to-day basis there can be one type of particle that has a more pronounced impact on visibility than others. However, all sources of these types of particles must be reviewed to develop an effective long-term strategy to make reasonable progress toward the national goal.

4.6. State of Arizona Visibility Monitoring Plan and Network

The Arizona Department of Environmental Quality (ADEQ), local agencies, and federal land managers at Arizona's 12 Class I areas are cooperatively operating a visibility monitoring network to track impairment of visual air quality. The Arizona Class I visibility network consists of visibility monitoring equipment provided by the Interagency Monitoring of PROtected Visual Environments (IMPROVE) monitoring program and additional equipment provided by ADEQ. The IMPROVE aerosol samplers collect particulate matter on filters (both $PM_{2.5}$ and PM_{10} fractions) which are routinely analyzed for chemical constituents. ADEQ and the National Park Service (NPS) have added optical monitoring equipment to measure visibility impairment, and meteorological monitoring equipment at most sites.

Arizona maintains a visibility monitoring operation plan. This visibility monitoring plan is updated when necessary to reflect updated IMPROVE and EPA guidance, and specific needs identified by ADEQ. ADEQ is an Associate Member of the IMPROVE Steering Committee and participates in the technical oversight of the IMPROVE network.

The chemical constituent data from the IMPROVE samplers are used to identify the chemical species and emission sources responsible for existing human-caused visibility impairment. The optical data show the visual air quality at a point as a person might experience the view. Nephelometers measure light scattering by particles at points collocated with the IMPROVE samplers, and at four areas, transmissometers also provide optical data on total light extinction along a path. Meteorological data are collected to provide a more complete understanding of the behavior of the atmosphere in general, as well as clarifying local air movement. These data are collectively used to track short-term and long-term trends, assess source contributions to visibility impairment that are reasonably attributable to a single source or group of sources, and determine the causes of regional visibility impairment at a given location.

The intent of this visibility monitoring operational plan is to characterize long-term trends in all Arizona Class I areas as completely as possible using ambient visibility measurements, within constraints of an area's size, terrain, or logistics, for each of the 12 federally-protected Class I areas in Arizona. In practical terms, one monitoring site or a group of sites may represent several Class I areas, or multiple locations of the same or different types of sites may represent an individual Class I area. This monitoring plan is designed to meet the following requirements of 40 CFR 51.305 and 40 CFR 51.308(d)(4): 1) to have a long-term monitoring strategy; 2) to track visibility trends at Arizona Class I areas; 3) to assist in identifying any attributable visibility impairment; and 4) to provide monitoring data, if necessary, for evaluating the impact of new or major modifications of categorical major sources. Arizona's monitoring program began in the spring of 1996, and the monitoring plan was updated in 2002. In addition to the state-sponsored IMPROVE monitoring, the National Park Service has maintained IMPROVE monitors (transmissometer and particle samplers) in Petrified Forest and Grand Canyon national parks since 1987, providing a long baseline of visibility measurements.

Pursuant to 40 CFR 51.305 and 40 CFR 51.308(d)(4), the State of Arizona maintains a monitoring plan to address visibility impairment. The State of Arizona relies on the IMPROVE program for data collection and processing and commits to the reporting of all visibility monitoring data to the Administrator at least annually for each Class I area in the State.

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5. STRATEGY TO ADDRESS REASONABLY ATTRIBUTABLE VISIBILITY IMPAIRMENT (RAVI)

Section 169A of the CAA contains the national goal that requires states to remedy existing visibility impairment and prevent future visibility impairment in the Class I areas. Initially, states containing mandatory Class I Federal areas were required to address the specific type of air pollution coming from existing stationary sources that could be anticipated to cause or contribute to visibility impairment. This type of pollution was commonly referred to as "plume blight," or more formally, reasonably attributable visibility impairment (RAVI). On December 2, 1980, the EPA determined that there were two types of air pollution that reduced or impaired visibility (45 FR 80084). One type was described as "smoke, dust, colored gas plumes, or layered haze emitted from stacks," and the second type was "widespread, regionally homogeneous haze from a multitude of sources" (Ibid, p. 80085).

The existing stationary sources subject to this regulation include any reconstructed source that was not in operation prior to August 7, 1962, and was in existence on August 7, 1977, and has the potential to emit 250 tons per year of any regulated pollutant. "In existence" is interpreted by the EPA to be consistent with the term, "commence construction" found in Prevention of Serious Deterioration (PSD) regulations (40 CFR 51.165(a)(1)(xvi) and 40 CFR 52.21(b)(9)). If construction commenced after August 7, 1977, the source would be subject to the PSD/NSR (new source review) program.

The SIPs developed to address visibility impairment from sources that could be reasonably anticipated to cause or contribute to visibility impairment in Class I areas had to include four specific things: (1) a monitoring plan to assist in the determination of what type of emissions were actually occurring in and near the Class I Area; (2) a way to determine what type of technological controls (best available retrofit technology or BART) could be used at a source should that source be found to cause or contribute – be found attributable – for the air pollution; (3) a process for addressing possible visibility impairment from new sources through existing New Source Review regulations, including review of that process by the FLMs; and (4) long-term strategies for dealing with existing and any future visibility impairment from stationary sources.

SIPs for 36 states were due to EPA by December 2, 1980. Unable to comply by the deadline, Arizona along with several other states, was cited on July 12, 1985, as failing to meet the requirements of 40 CFR 51.305, monitoring, and 51.307, new source review (50 FR 28545). On November 24, 1987, Arizona was cited as failing to meet the requirements of 40 CFR 51.306, long-term strategies, and 51.302, control strategies (i.e., BART).[13] Failure to meet the requirements in 40 CFR 51.302, 305, 306, and 307 through a SIP meant EPA imposed a Federal Implementation Plan or FIP (52 FR 45134, November 24, 1987). Included in the 1987 FIP was FLM certification of three Class I areas in Arizona for visibility impairment: Grand Canyon National Park, Petrified Forest National Park, and Saguaro Wilderness.

On September 15, 1988, EPA published its assessment of the Class I areas certified by the FLMs that included an assessment of the three Arizona areas named in 1987 (53 FR 35956). By 1991, EPA published a final rule that revised Arizona's FIP to reflect an analysis of the visibility impairment at Grand Canyon National Park for an attributable stationary source, Navajo Generating Station (56 FR 50172).

For the purpose of addressing the process the State of Arizona could use in the event of future certifications, a State rule has been promulgated for reasonably attributable visibility impairment. That

[13] Arizona was not cited for failure to meeting 51.304, integral vistas, as no integral vistas have been listed in Arizona. Integral vistas are areas outside the boundary of a Class I Area, but visible from within it.

rule, effective December 2, 2003, can be found in Appendix A-5a. The following sections discuss how Arizona is now meeting the requirements of 40 CFR 51.302 through 307, which should allow EPA to remove the existing FIP.

5.1. Implementation of Control Strategies

Pursuant to 40 CFR 51.302, states must have a procedure in place to analyze and, if necessary, implement control strategies for RAVI, and imposition of best available retrofit technology (BART) for any eligible source whose emissions are found to cause or contribute to visibility impairment. Arizona's RAVI rule can be found in Appendix A-5a; a list of the BART-eligible sources is listed in Section 1601 of the rule. Arizona's RAVI rule also serves as the authority for the possible implementation of controls under "geographical enhancement" for any stationary source found to impair visibility via the WEB Trading Program as outlined in Chapter 8 of this SIP.

40 CFR 51.302 also requires the state to communicate with the FLMs and provide for consultation on any matters pertaining to visibility impairment. A letter notifying the FLMS of the State of Arizona's visibility contact person, as well as the opportunity to review this SIP prior to any public hearings, can be found in Appendix A-5b. A subsequent letter notifying the FLMs of the public comment period, and locations and dates of public hearings for this SIP can also be found in Appendix A-5b. All supporting documents related to the promulgation of Arizona's RAVI rule can also be found in Appendix A-5c.

5.2. Exemptions from Controls

Pursuant to 40 CFR 51.303, any source found attributable for visibility impairment and required to install and operate BART, may request a federal exemption from BART. This federal exemption process is incorporated by reference in R18-2-1606 of Arizona's RAVI rule. At this time, no source in the State of Arizona has requested a federal exemption from BART.

5.3. Identification of Integral Vistas

Pursuant to 40 CFR 51.304, any identified integral vista must be addressed on an equivalent basis as for any Class I Area. An integral vista is a specific landmark or panorama located outside the boundary of a mandatory Federal Class I Area, but visible from that Class I Area. Therefore, any impairment within the Class I Area could possibly impact the integral vista as well. No integral vistas have been identified to date for the State of Arizona's 12 mandatory Class I Federal areas (52 FR 45132, November 24, 1987).

5.4. Monitoring

Pursuant to 40 CFR 51.305, the State of Arizona has developed a monitoring plan for the 12 Class I areas. The plan, *Arizona Class I Area Visibility Monitoring Operational Plan (Monitoring Plan)*, published in 1996 and updated in 2002, includes a commitment to, "characterize long-term trends in all Arizona Class I areas as completely as possible using ambient visibility measurements, within constraints of an area's size, terrain, or logistics, for each of the 12 Class I areas in Arizona" (p. 3 *Monitoring Plan*).

Arizona's *Monitoring Plan* was developed with the full cooperation of the FLMs, other related agencies and counties as well as air quality specialists in the field of monitoring, data gathering and assessment, and meteorology. The *Monitoring Plan* is reviewed annually and contains four objectives that also serve to meeting the needs of any visibility regulations promulgated by the State of Arizona to meet RAVI. The objectives are: (1) long-term monitoring strategy, (2) track visibility trends at Arizona

Class I areas, (3) assist in identifying any reasonably attributable visibility impairment impacts, and (4) provide monitoring data if necessary for new or major modifications of categorical major sources.

Along with providing a network of visibility monitors, the *Monitoring Plan* also accounts for the long-standing IMPROVE monitoring program and integration with EPA's PM 2.5 monitoring guidance. IMPROVE was established in 1985 to coordinate the monitoring of national parks and wilderness areas and to ensure sound and consistent scientific methods were being employed. The IMPROVE Steering Committee established monitoring protocols for visibility measurement, particulate matter measurement, and scientific photography of the Class I areas. IMPROVE monitoring is designed to established reference information on visibility conditions and trends to aid in the development of visibility protection programs.

5.5. Long-term Strategy Requirements

Pursuant to 40 CFR 51.306, a long-term strategy for RAVI must be established in the SIP. This strategy must cover a 10-15 year period. Arizona's submittal under 40 CFR 51.309 fulfills the long-term strategy requirements for RAVI for stationary sources. Should any source be found attributable for visibility impairment and subsequently required to install and operate BART, the State of Arizona commits to submitting a SIP revision (as required by R18-2-1605(B)), meeting the review requirements for the long-term strategies as outlined in 51.306(e), including any impact resulting from the imposition of controls or exemption from controls for BART.

5.6. New Source Review for Visibility Protection

Pursuant to 51.307, the State of Arizona's R18-2-410 (Article 4, New Source Review, *Arizona Administrative Code*) addresses the requirements of new sources to meet performance standards to assure emissions will not have an impact on visibility in Arizona's 12 Class I areas. The rule can be found in Appendix A-5d.

On September 1, 1994, EPA deemed the State of Arizona SIP revision for New Source Review (NSR) / Prevention of Significant Deterioration (PSD) and minor NSR source programs complete and is awaiting further EPA action.

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6. LONG-TERM STRATEGY FOR THE CLEAN AIR CORRIDOR

6.1. Regulatory History and Requirements

One of the requirements of the Regional Haze Rule (40 CFR 51.309(d)(3)) is to finalize earlier work initiated by the GCVTC to address clean-air corridors. One of the tasks of the GCVTC required by CAA 169B was to determine whether any clean-air corridors exist for any of the 16 GCVTC Class I areas. A clean-air corridor is a geographic region that contributes clean air to a Class I area on the days with best visibility. If clean-air corridor(s) were found to exist, the GCVTC was required to recommend whether additional control strategies were needed to manage emissions growth to protect visibility on the least impaired days in the Class I areas. For the purpose of its assessment, the GCVTC considered the average of the days representing the 20% best visibility conditions to be the least impaired days. EPA also used this definition in defining the term in the 1999 Regional Haze Rule (40 CFR 51.308 and 40 CFR 51.309).

In 1995, the GCVTC Meteorology Subcommittee completed an analysis of the geographical source areas contributing to least impaired days in the 16 GCVTC Class I areas. The analysis, in a report entitled, *Clean-Air Corridors: A Framework for Identifying Regions that Influence Clean Air on the Colorado Plateau,*[14] showed that the area north and west of the Grand Canyon National Park does provide clean air to the Grand Canyon area primarily due to a combination of favorable meteorological conditions and low emissions of pollutants from the sparsely populated area. The GCVTC Public Advisory Committee (PAC) reviewed the clean-air corridor analysis and emission projections and determined expected emissions growth was less than the amount that would degrade visibility on the least impaired days in the 16 Class I areas. Based on this finding, the PAC recommended emissions growth be monitored in the future but that no additional control strategies were needed in the identified clean-air corridor at that time. The GCVTC adopted this recommendation and included it in its final report to EPA, which was integrated into the regional haze rule (40 CFR 51.309(d)(3)).

The Regional Haze Rule requires states submitting SIPs under 40 CFR 51.309 to determine if there were additional areas(s) to be considered as clean-air corridors for emission tracking purposes in the GCVTC areas. The successor to the GCVTC, the Western Regional Air Partnership (WRAP), completed an economic/technical analysis to validate the growth projections in the clean air corridors. This analysis was included as part of a consensus policy adopted by the WRAP Board in November, 2002. A copy of this policy, *WRAP Policy on Clean Air Corridors,* is contained in Appendix A-6a. The WRAP policy defined a clean air corridor consistent with the range of optional clean air corridor definitions identified by the GCVTC Meteorology Subcommittee. The final clean air corridor included a recognition of county-level emissions inventory practices, and an emissions tracking requirement in the clean air corridor. The technical studies and findings used as the basis for the WRAP Clean-Air Corridor Policy are located in Chapter 3 of the WRAP Technical Support Document.

The most recent projections of visibility conditions at the 16 GCVTC Class I areas performed by WRAP is discussed in Chapter 14.

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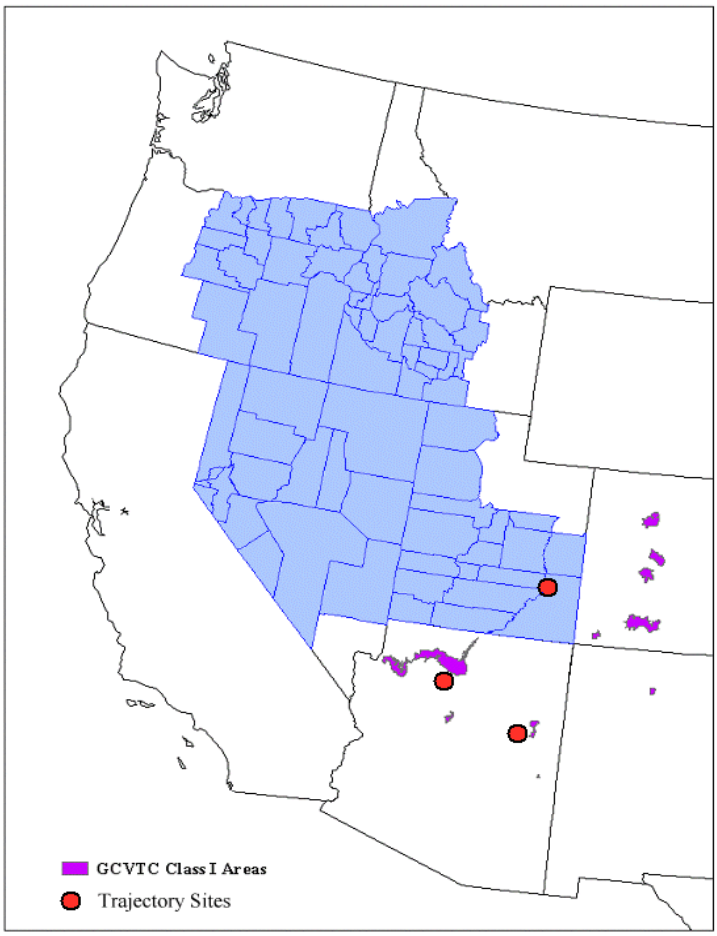
[14] *Clean Air Corridors: Framework for Identifying Regions that Influence Clean Air on the Colorado Plateau,* Meteorology Subcommittee of the Grand Canyon Visibility Transport Commission; Western Governors' Association: Denver, CO, July 1995.

6.2. Identification of Clean Air Corridor; Other Clean Air Corridors

Pursuant to 40 CFR 51.309(d)(3)(i), the State of Arizona concurs that there is an existing clean-air corridor as defined in the *WRAP Policy on Clean-Air Corridors*. The boundary of the clean-air corridor is indicated on the map in Figure 6-1 provided below. No portion of Arizona is inside the clean-air corridor.

Figure 6-1. Map of the Clean Air Corridor in the Transport Region



This Clean Air Corridor was identified using studies conducted by the Meteorological Subcommittee of the Grand Canyon Visibility Transport Commission, and then updated by the WRAP based on an assessment described in the *WRAP Policy on Clean-Air Corridors*, and related technical analysis conducted by the WRAP.

The State of Arizona, pursuant to 40 CFR 51.309(d)(3)(v), has determined, based on the *WRAP Policy on Clean-Air Corridors* and technical analysis, that no other clean-air corridors are identified at this time. The State of Arizona commits to participating in a regional effort to review this determination as part of periodic plan revisions required under 40 CFR 51.309(d)(10).

6.3. Strategy for Clean Air Corridors

(a) Comprehensive emissions tracking program. Pursuant to 40 CFR 51.309(d)(3), a comprehensive emissions tracking system has been established to track emissions inside and outside the clean-air corridor, as specified in (b) below, to ensure that visibility is not degraded on the least-impaired days in any of the 16 Class I areas of the Colorado Plateau. This comprehensive emissions tracking system was developed by the WRAP to assist the above states in meeting this requirement. Appendix A-6b of this SIP describes the WRAP comprehensive emissions tracking system, and the process by which the WRAP will summarize annual emission trends in order to identify any significant emissions growth that could lead to visibility degradation in the 16 Class I areas. Included in this summary will be an assessment of whether any significant emissions growth has occurred within the Clean Air Corridor, in accordance with *(c)* below. The State of Arizona will work cooperatively with states not submitting a plan revision under 40 CFR 51.309 that have emissions within or outside the clean-air corridor that could affect air quality in the clean-air corridor, to assure the emissions are incorporated into the tracking program through inter-state consultation.

(b) Patterns of growth within the clean-air corridor. Pursuant to 40 CFR 51.309(d)(3)(ii), the State of Arizona has determined, based on the *WRAP Policy on Clean-Air Corridors* and WRAP technical analysis, that current projections of emissions changes inside the identified clean-air corridor will not contribute to degradation of visibility on the least impaired days in the 16 Class I areas during the planning period through 2018. Future emissions growth will be tracked in accordance with the comprehensive emissions tracking system noted in (*a)* above. The WRAP will summarize annual emission trends within the clean-air corridor and assess whether any significant emission growth has occurred within the corridor as an analysis tool for states.

(c) Patterns of growth outside the Clean Air Corridor. Pursuant to 40 CFR 51.309(d)(3)(iii), the State of Arizona has determined, based on the *WRAP Policy on Clean-Air Corridors* and technical analysis conducted by the WRAP, that outside the Clean Air Corridor identified in Section 6.2, above, there is no emissions growth occurring at this time that is contributing to visibility impairment within the Clean Air Corridor in any of the 16 Class I areas of the Colorado Plateau As part of the WRAP's annual summary of emission trends within the corridor, an assessment will be made of emission and monitoring data trends outside the Clean Air Corridor, in order to determine if significant emissions growth is occurring outside the corridor that could be impairing air quality within the corridor, and resulting in visibility impairment in the 16 Class I areas.

(d) Actions if impairment inside or outside the Clean Air Corridor occurs. The State of Arizona, in coordination with other transport region states and tribes, will review the WRAP's annual summary of emission trends within the Clear Air Corridor and whether any significant emissions growth was identified within the corridor in accordance with *(b)* above, or was identified outside the corridor, in accordance with *(c)* above. If significant emissions growth is identified, the State of Arizona in coordination with other transport region states and tribes, will conduct or seek WRAP assistance in conducting an analysis of the effects of this emissions growth in terms of possible impact on air quality within the corridor and possible degradation of the least-impaired days in any of the 16 Class I areas of the Colorado Plateau. Pursuant to 40 CFR 51.309(d)(3)(iv), if this analysis finds that this growth is causing visibility impairment in the 16 Class I areas, the State of Arizona in coordination with other transport states and tribes will evaluate the need for additional emission reduction measures, and identify an implementation schedule for such measures, if needed. The implementation of any additional emission measures shall be coordinated with all appropriate transport region states and tribes, on a mutually agreed upon timetable, and reported to EPA in accordance with the periodic progress reports required under 40 CFR 51.309(d)(10)(i). If the WRAP regional planning process is unable to perform such an analysis for

the GCVTC Class I areas in Arizona, or come to a consensus on the interpretation of such an analysis, the State of Arizona will perform such studies and engage in independent interstate consultation provided for under 40 CFR 51.309(d)(11).

7. LONG-TERM STRATEGY FOR STATIONARY SOURCES

7.1. Regulatory History and Requirements

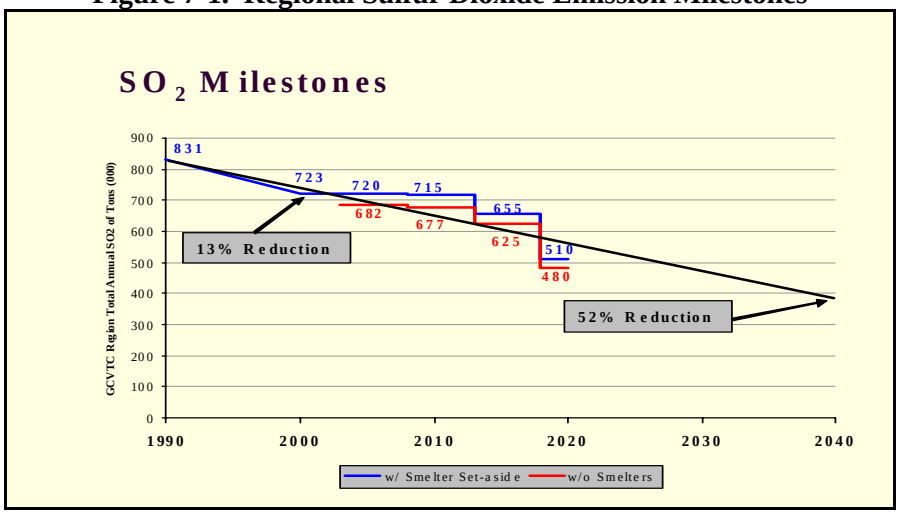
The Grand Canyon Visibility Transport Commission (GCVTC) studied the long-term projected changes of emissions from stationary sources. It was found that emissions of sulfur dioxide from stationary sources would decline by at least 13% between 1990 and 2000. Also, emissions of sulfur dioxide would continue to decline through 2040 when only 30% to 50% of the 1990 emission levels would remain. This decline was due to the normal turnover of source technology as older sources retire and are replaced by newer and cleaner technologies.

The GCVTC decided that the most effective way to address emissions of sulfur dioxide from stationary sources was to establish regional emission milestones and provide for a backstop program to achieve necessary emission reductions. If the emission reduction milestones are not achieved, then a backstop market trading program will be implemented.

In Section 309(d)(4)(ii-iv) of the Regional Haze Rule, EPA required the states to complete the development of a backstop market trading program for sulfur dioxide. The WRAP submitted the Annex to EPA in October 2000.[15] On June 5, 2003, EPA approved the program (68 FR 33764). Chapter 8 of this SIP contains the regional Sulfur Dioxide Milestones and Backstop Trading Program as required under Section 309(h) of the June 5, 2003, revised Regional Haze Rule. To keep the actual program as detailed in Chapter 8 intact, what follows here is a summary of the major elements of the program.

- Regional milestones, SO_2 emissions tracking requirements, and methodology the State of Arizona would use to determine allocations and manage the allowance tracking system should the program be "triggered" by the violation of any of the milestones as shown in Figure 7-1.

Figure 7-1. Regional Sulfur Dioxide Emission Milestones



[15] Western Regional Air Partnership. Voluntary Emissions Reduction Program for Major Industrial Sources of Sulfur Dioxide in Nine Western States and a Backstop Market Trading Program, An Annex to the Report of the Grand Canyon Visibility Transport Commission. Denver, CO. September 29, 2000.

- Description of the regulatory authority for the SO_2 Milestones and Backstop Trading Program. The Western Backstop SO_2 Trading Program Rule establishes the procedures and compliance requirements for the participating states, tribes, and affected sources. Appendix A-7a contains the State of Arizona's draft rule based on the Western Backstop SO_2 Trading Program Model Rule. This draft rule also contains requirements for participating sources under the pre-trigger portion of the program found in Section 8.2.1 of the SO_2 Milestones and Backstop Trading Program. The State of Arizona commits to the promulgation of a State rule for the Western Backstop SO_2 Trading Program as expeditiously as practicable.

- Authority to require major industrial sources of SO_2 to submit an annual emissions inventory in the pre-trigger phase of the program to measure compliance with the regional SO_2 milestones. The authority for Arizona to require sources to meet this requirement of Section 8.2.1 of the SO_2 Milestones and Backstop Trading Program is contained in the draft rule in Appendix A-7a. Again, the State of Arizona commits to the promulgation of a State rule for the Western Backstop SO_2 Trading Program as expeditiously as practicable.

- Establishment of a WRAP standing committee to develop the coordination procedures for the program. This "309 Coordinating Committee" will be formally proposed at the WRAP Board Meeting to be held in October 2003. Appendix A-7b contains the proposal approved by the WRAP Board on October 15, 2003 for the establishment of the WRAP 309 Coordinating Committee.

7.2. Monitoring and Reporting of Stationary Source Sulfur Dioxide Emissions.

Achievement of Greater Than a 13% Reduction in Sulfur Dioxide by 2000. One item that must be included in the first SIP under Section 309(d)(4)(i) is monitoring and reporting of stationary source sulfur dioxide (SO_2) emissions. This monitoring and reporting data must be sufficient to determine whether a 13 % reduction in actual stationary source SO_2 emissions has occurred between the years 1990 and 2000, and whether milestones required by Section 51.309(d)(4)(ii) have been achieved for the transport region. As shown in Table 7-1, regional SO_2 emission totals show that there has been a 25 percent reduction in these emissions from 1990 to 2000.[16] Details of the source of emission inventories used for this calculation are in the Chapter 4 of the WRAP TSD.

Table 7-1. State-by-State Comparison of 1990 and 2000 Stationary Source Sulfur Dioxide Emissions in the 9 GCVTC Transport Region States (tons per year)

States	1990	2000
Arizona	185,398	99,133
California	52,832	38,501
Colorado	95,534	99,161
Idaho	24,652	27,763
Nevada	52,775	53,943
New Mexico	177,994	117,344
Oregon	17,705	23,362
Utah	85,567	38,521
Wyoming	136,318	124,110
Totals	**828,775**	**621,838**

7.3.

[16] *Year 2000 Point Source SO_2 Emissions Analysis - 9 State Western Region Report*, E.H. Pechan & Associates, Inc. for the Western Governors' Association; Denver, CO, May 2002.

Report on Assessment of NOx/PM Strategies

Provisions for Stationary Source NO_X and PM. Pursuant to 40 CFR 51.309(d)(4)(v), the State of Arizona has included in this SIP a report which assesses emissions control strategies for stationary sources of NOx and PM, and the degree of visibility improvement that would result from implementation of the identified strategies. The report, *Stationary Source NOx and PM Emissions in the WRAP Region: An Initial Assessment of Emissions, Controls, and Air Quality Impacts,* was prepared by the WRAP and is included in Appendix A-7c. The report represents the State of Arizona's initial assessment of stationary source NOx and PM strategies for regional haze. The State of Arizona has determined that NOx and PM strategies are not needed at this time. The State of Arizona commits to adopting long-term strategies and Best Available Retrofit Technology (BART) requirements for stationary sources of NOx and PM as a SIP revision in 2008 if Arizona determines such emission control strategies are needed to demonstrate reasonable progress.

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8. SO_2 MILESTONES AND BACKSTOP TRADING PROGRAM

8.1. Milestones and Determination of Program Trigger

8.1.1. Regional SO_2 Milestones

(1) Base Milestone Values. The regional sulfur dioxide base milestones for the years 2003 through 2018 are provided in Table 8-1. The base milestones will be adjusted annually as described in paragraphs 8.1.1(2), (3) and (4) of this plan.

Table 8-1. Base Sulfur Dioxide Emissions Milestones (excludes Smelter Set-aside)

Column 1	Column 2	Column 3
For the year	the base regional sulfur dioxide milestone is	and the annual SO_2 emissions for these years will determine whether emissions are greater than or less than the milestone
2003	682,000 tons SO_2	2003
2004	682,000 tons SO_2	Average of 2003 and 2004
2005	682,000 tons SO_2	Average of 2003, 2004 and 2005
2006	682,000 tons SO_2	Average of 2004, 2005 and 2006
2007	682,000 tons SO_2	Average of 2005, 2006 and 2007
2008	680,333 tons SO_2	Average of 2006, 2007 and 2008
2009	678,667 tons SO_2	Average of 2007, 2008 and 2009
2010	677,000 tons SO_2	Average of 2008, 2009 and 2010
2011	677,000 tons SO_2	Average of 2009, 2010 and 2011
2012	677,000 tons SO_2	Average of 2010, 2011 and 2012
2013	659,667 tons SO_2	Average of 2011, 2012 and 2013
2014	642,333 tons SO_2	Average of 2012, 2013 and 2014
2015	625,000 tons SO_2	Average of 2013, 2014 and 2015
2016	625,000 tons SO_2	Average of 2014, 2015 and 2016
2017	625,000 tons SO_2	Average of 2015, 2016 and 2017
2018	480,000 tons SO_2	Year 2018 only
2019 forward, until replaced by an approved SIP	480,000 tons SO_2	Annual; no multiyear averaging

(2) Adjustments for participation by eligible States and Tribes. The amount provided in Table 8-2 below will be subtracted from the milestone in Table 3 for each state and tribe that does not have an Implementation Plan approved by the EPA Administrator as meeting the requirements of 40 CFR 51.309 as of December 31 of the year following the milestone year. The first adjustment to the 2003 milestone will be made no later than March 31, 2005, and will be based on all states and tribes that do not have a federally-approved Implementation Plan as of December 31, 2004.

Table 8-2a. (Years 2003-2010) Amounts of SO_2 Tons To Be Subtracted from the Base Milestones for States and Tribes That Do Not Have an Approved Implementation Plan under 40 CFR 51.309*

State or Tribe	2003	2004	2005	2006	2007	2008	2009	2010
1. Arizona	117,372	117,372	117,372	117,372	117,372	117,941	118,511	119,080
2. California	37,343	37,343	37,343	37,343	37,343	36,363	35,382	34,402
3. Colorado	98,897	98,897	98,897	98,897	98,897	98,443	97,991	97,537
4. Idaho	18,016	18,016	18,016	18,016	18,016	17,482	16,948	16,414
5. Nevada	20,187	20,187	20,187	20,187	20,187	20,282	20,379	20,474
6. New Mexico	84,624	84,624	84,624	84,624	84,624	84,143	83,663	83,182
7. Oregon	26,268	26,268	26,268	26,268	26,268	26,284	26,300	26,316
8. Arizona	42,782	42,782	42,782	42,782	42,782	42,795	42,806	42,819
9. Wyoming	155,858	155,858	155,858	155,858	155,858	155,851	155,843	155,836
10. Navajo Nation	53,147	53,147	53,147	53,147	53,147	53,240	53,334	53,427
11. Shoshone-Bannock Tribe of the Fort Hall Reservation	4,994	4,994	4,994	4,994	4,994	4,994	4,994	4,994
12. Ute Indian Tribe of the Uintah and Ouray Reservation	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129
13. Wind River Reservation	1,384	1,384	1,384	1,384	1,384	1,384	1,384	1,384

*These numbers differ from Annex opt-in/-out tables in that the smelter set-aside is excluded and the new source set-aside is included.

Table 8-2b. (Years 2011-2018) Amounts of SO_2 tons to be Subtracted from the Base Milestones for States and Tribes that do not have an Approved Implementation Plan under 40 CFR 51.309*

State or Tribe	2011	2012	2013	2014	2015	2016	2017	2018
1. Arizona	119,080	119,080	116,053	113,025	109,998	109,998	109,998	82,302
2. California	34,402	34,402	33,265	32,128	30,991	30,991	30,991	27,491
3. Colorado	97,537	97,537	94,456	91,375	88,294	88,294	88,294	57,675
4. Idaho	16,414	16,414	15,805	15,197	14,588	14,588	14,588	13,227
5. Nevada	20,474	20,474	20,466	20,457	20,449	20,449	20,449	20,232
6. New Mexico	83,182	83,182	81,682	80,182	78,682	78,682	78,682	70,000
7. Oregon	26,316	26,316	24,796	23,277	21,757	21,757	21,757	8,281
8. Utah	42,819	42,819	41,692	40,563	39,436	39,436	39,436	30,746
9. Wyoming	155,836	155,836	151,232	146,629	142,025	142,025	142,025	97,758
10. Navajo Nation	53,427	53,427	52,707	51,986	51,266	51,266	51,266	44,772
11. Shoshone-Bannock Tribe of the Fort Hall Reservation	4,994	4,994	4,994	4,994	4,994	4,994	4,994	4,994
12. Ute Indian Tribe of the Uintah and Ouray Reservation	1,135	1,135	1,135	1,135	1,135	1,135	1,135	1,135
13. Wind River Reservation	1,384	1,384	1,384	1,384	1,384	1,384	1,384	1,384

*These numbers differ from Annex opt-in/-out tables in that the smelter set-aside is excluded and the new source set-aside is included.

(3) Adjustment for Future Operation of Copper Smelters in Arizona and New Mexico. If either the BHP San Manuel smelter in Arizona or the Phelps Dodge Hidalgo smelter in New Mexico resumes

operation, the milestones will be increased as described below. The adjustment will occur only if the respective state has a State Implementation Plan approved by the EPA Administrator under 40 CFR 51.309. Once the adjustments have been made, the milestones will not be changed due to future suspensions or changes in plant operations, except as provided below. If Arizona or New Mexico elect not to submit a SIP under 40 CFR 51.309, the emissions for the smelters in the state opting out will be subtracted from the smelter set-aside.

(a) If one or both smelters resume operations under their existing permits, the milestone will be adjusted upward for each smelter respectively by the following amounts:

1. Phelps Dodge Corporation, Hidalgo Smelter: 22,000 tons SO_2
2. BHP, San Manuel Smelter: 16,000 tons SO_2
3. For the 2013 through 2018 milestones, the maximum increase will be 30,000 tons SO_2.

(b) If Arizona or New Mexico determines that either smelter will resume operation by operating only a portion of the plant, the milestone adjustment in (a) will be reduced by a percentage to reflect current conditions. If the smelter resumes normal operations at a later date, the full adjustment described in (a) will be applied.

(c) If one or both smelters resume operations after going through new source review, the milestone adjustment will be based on the new permitted level for the source, but in no instance may the adjustment to the milestones exceed 22,000 tons SO_2 per year for the Hidalgo Smelter or 16,000 tons SO_2 per year for the San Manuel Smelter.

(d) If one or both smelters do not resume operation, the State of Arizona will determine, based on the calculation procedures in section 8.1.3(4) of this plan, the amount of source-specific set aside that will be added to the milestone to account for capacity expansion at the remaining smelters. This set-aside will only be available for use if sulfur input and emissions from the copper smelters are above the baseline level listed in Table 8-3 in any particular year as a result of increased capacity. The increase to the milestone will be based on a smelter's proportional increase above its baseline sulfur input. The set-aside will be recalculated every year to reflect actual operations of the remaining copper smelters. The set-aside may not be traded under the backstop trading program.

Table 8-3. Preliminary Smelter-Specific Set Aside

Company/Smelter	Baseline Sulfur Input	Baseline Allocation	Smelter-specific Set-aside
BHP San Manuel	417,200 tons	16,000 tons SO_2	1,500 tons SO_2
Asarco Hayden	235,000 tons	23,000 tons SO_2	3,000 tons SO_2
Phelps Dodge Chino	212,800 tons	16,000 tons SO_2	3,000 tons SO_2
Phelps Dodge Hidalgo	256,800 tons	22,000 tons SO_2	4,000 tons SO_2
Phelps Dodge Miami	208,700 tons	8,000 tons SO_2	2.000 tons SO_2
Kennecott Copper Corporation, Smelter and Refinery	340,269 tons	1,000 tons SO_2	100 tons SO_2
TOTAL	**1,670,769 tons**	**86,000 tons SO_2**	**13,600 tons SO_2**

(4) Other Milestone Adjustments.

(a) All other milestone adjustments will require a SIP revision. Section 8.1.3(3) of this plan outlines adjustments to be made to the emissions inventory to ensure a consistent comparison to

the milestones. These adjustments will be incorporated into the milestones every five years as part of the periodic SIP revisions required by 40 CFR 51.309(d)(10). Adjustments to the milestones shall be tracked in the annual emissions report in section 8.1.3(3) of this plan.

(b) Within ninety days of the periodic SIP revision incorporating adjustments based on section 8.1.3(3) of this plan, the State of Arizona shall provide notice to sources whose records were used to calculate the adjustments, including the date of the SIP revision reflecting the milestone adjustment to sources whose records were used as the basis for the milestone adjustment and a statement that the source needs to retain the record for at least five years from the date of the SIP revision, or ten years from the date of establishing the record, whichever is longer.

8.1.2. Regional Program Administration

(1) Pre-trigger tracking of regional SO_2 emissions. The State of Arizona will work cooperatively with the states and tribes that are participating in the SO_2 Milestones and Backstop Trading Program to ensure that an emission tracking system for the regional SO_2 inventory is developed and maintained. The State of Arizona is responsible for all regional program administration functions as described in this plan. The State of Arizona will perform these functions using the Western Regional Air Partnership (WRAP) as the State of Arizona's agent. The WRAP compiled the SO_2 emission inventories that were used during the development of the Annex, and the WRAP continues to refine and improve the overall tracking system for the regional haze. The WRAP will maintain the outlined pre-trigger emissions tracking functions in the foreseeable future. If the WRAP is no longer able to fulfill this function, then the State of Arizona will ensure that other arrangements are made, either through a different regional organization or through a contractor, to maintain the SO_2 tracking system that is described in this plan. The WRAP has no authority to make regulatory determinations. The WRAP has limited authority under this plan to perform tracking and accounting functions, prepare reports, and perform other administrative functions as directed by the State of Arizona. The State of Arizona will work expeditiously to correct any problems if the WRAP fails to perform any of the functions described in this plan in a timely manner.

(2) Designation of the Tracking System Administrator. If the backstop trading program is triggered due to an exceedance of the SO_2 milestones as outlined in section 8.1.3 of this plan, the State of Arizona will work cooperatively with the other participating states and tribes to designate one Tracking System Administrator (TSA). The TSA will be designated as expeditiously as possible, but no later than six months after the program trigger date. In addition, before the TSA is designated, the State of Arizona will enter into a binding contract with the TSA that will require the TSA to perform all TSA functions described in this plan. The State of Arizona has sufficient authority under State contract law to ensure that the functions in this plan are carried out by the TSA.

(3) Information Provided by other States and Tribes. The State of Arizona will accept the emission inventory and permitting information provided by the other participating states and tribes in order to determine the milestone value and program trigger if such other states and tribes have provided proper documentation and followed the public notification process in their federally approved implementation plans.

8.1.3. Determination of Program Trigger

(1) Until the program has been triggered and source compliance is required, the State of Arizona will submit an annual emissions report to the WRAP and all participating states and tribes by September 30 of each year. The report will document actual sulfur dioxide emissions during the previous calendar year for all sources subject to the Sulfur Dioxide Milestone Inventory requirements. The first report for calendar year 2003 will be submitted by September 30, 2004. The State of Arizona will prepare the supporting documentation that is included with the annual emissions report as noted in (2) and (3) below.

(2) The annual emissions report for Arizona will include a source emissions change report that contains the following information:

(a) identification of any new sources that were not contained in the previous calendar year's emissions report, and an explanation of why the source is now included in the program;

(b) identification of any sources that were included in the previous year's report and are no longer included in the program, and an explanation of why this change has occurred; and

(c) an explanation for increases or decreases of emissions at any applicable source or more than twenty percent from the previous year.

(3) The annual emissions report for Arizona will include the proposed emission adjustment as described in (a) through (c) to ensure a consistent comparison to the milestones.

(a) Changes in flow rate measurement methods. Actual emission inventories for utilities that use EPA's Reference Method 2F, 2G, or 2H to measure stack flow rate will be adjusted to be comparable with the flow rate assumptions that were used in 1999, the base year inventory for the Annex. The adjustment may be calculated using any of the following three methods, and emissions for the year 2018 will not be adjusted.

(i) Directly determine the difference in flow rate through a side-by-side comparison of data collected with the new and old flow reference methods during a relative accuracy test audit (RATA) test.

(ii) Compare the annual average heat rate using Acid Rain heat input data (MMBtu) and total generation (MWHrs) as reported to the Federal Energy Information Administration. Under this approach, the flow adjustment factor will be calculated using the following ratio:

$$\frac{\text{Heat input/MW for first full year of data using new flow rate method}}{\text{Heat input/MW for last full year of data using old flow rate method.}}$$

(iii) Compare the standard CFM per MW before and after the new flow reference method based on CEMs data submitted in the Acid Rain Program, as follows:

$$\frac{\text{SCF/Unit of Generation for first full year of data using new flow rate method}}{\text{SCF/Unit of Generation for last full year of data using old flow rate method.}}$$

(b) Changes in emission monitoring or calculation methods. Actual emission inventories for sources that change the method of monitoring or calculating their emissions will be adjusted to be comparable to the emission monitoring or calculation method that was used in the base year inventory for the Annex (1999 for utilities and 1998 for all other sources).

(c) Changes due to enforcement actions.

(i) Adjustments due to enforcement actions arising from settlements. Adjustments to the milestones shall be made, as specified in section 8.1.3(3) and (4), if:

(A) an agreement to settle an action, arising from allegations of a failure of an owner or operator of an emissions unit at a source in the program to comply with applicable regulations which were in effect during the base year, is reached between the parties to the action;

(B) the alleged failure to comply with applicable regulations affects the assumptions that were used in calculating the source's base year and forecasted sulfur dioxide emissions; and

(C) the settlement includes or recommends an adjustment to the milestones.

(ii) Adjustments due to enforcement actions arising from administrative or judicial orders. Adjustments to the milestones shall be made as directed by any final administrative or judicial order, as specified in section 8.1.3(3) and (4). Where the final administrative or judicial order does not include a reforecast of the source's baseline, the State of Arizona shall evaluate whether a reforecast of the source's baseline emissions is appropriate.

(iii) Adjustments method and effective dates. Based on section 8.1.3(3) and (4), the milestone must be decreased by an appropriate amount based on a reforecast of the source's decreased sulfur dioxide emissions. The adjustments do not become effective until after the source has reduced its sulfur dioxide emissions as required in the settlement agreement, or administrative or judicial order. All adjustments based upon enforcement actions must be made in the form of an SIP revision that complies with the procedural requirements of 40 CFR 51.102 and 51.103.

(iv) Documentation of adjustments for enforcement actions. In the periodic plan revision required under 40 CFR 51.309(d)(10), the State of Arizona shall include the following documentation of any adjustment due to an enforcement action:

(A) identification of each source under the State of Arizona 's jurisdiction that has reduced sulfur dioxide emissions pursuant to a settlement agreement or an administrative or judicial order;

(B) for each source identified, a statement indicating whether the milestones were adjusted in response to the enforcement action;

(C) discussion of the rationale for the State of Arizona 's decision to adjust or not to adjust the milestones; and

(D) if SO_2 emissions reductions over and above those reductions needed for compliance with the applicable regulations were part of an agreement to settle an action, a statement indicating whether such reductions resulted in any adjustment to the milestones or allowance allocations, and a discussion of the rationale for the State of Arizona 's decision on any such adjustment.

(4) The annual sulfur dioxide milestone and emissions report for Arizona will document any adjustments that should be made to the milestone for the previous year as follows.

(a) The State of Arizona will document the submittal date of this Implementation Plan to implement the regional WEB Trading Program, and the approval date by the EPA Administrator, if applicable.

(b) If actual emissions and sulfur input are greater than the baseline level in Table 3, and either the BHP San Manuel smelter in Arizona or the Phelps Dodge smelter in New Mexico have not resumed operation, the State of Arizona will determine the milestone adjustment for all copper smelters in Arizona by determining the increase in the milestone based on the proportional increase in sulfur input over baseline levels. For each smelter, the adjustment will not exceed the smelter-specific set-aside listed in Table 8-3.

(c) Arizona shall determine the status of BHP San Manuel copper smelter during the previous year. If the smelter resumed operation during the milestone year, the report shall include:

(i) the date the smelter resumed operation;

(ii) a determination by Arizona that either,

(A) the smelter resumed production consistent with past operations,

(B) the smelter was required to go through new source review, in which case Arizona shall include the new SO_2 permitted limit for BHP San Manuel in the report, or

(C) the smelter resumed operations in a substantially different manner such that emissions will be less than for past operations, in which case Arizona shall determine expected emissions from the operations.

(d) a proposed adjustment to the sulfur dioxide milestone to account for the operation of the BHP San Manuel smelter.

(e) Comparison of actual emissions from all smelters in [state] to the baseline emissions level for that smelter listed in Table 3. If actual emissions and sulfur input are greater than the baseline levels in Table 3, and either the BHP San Manuel smelter in Arizona or the Phelps Dodge smelter in New Mexico have not resumed operation, [state] shall determine the milestone adjustment by determining the increase in the milestone based on the proportional increase in sulfur input over baseline levels. For each smelter, the adjustment shall not exceed the smelter-specific set-aside listed in Table 3.

The following example is for illustrative purposes:

Asarco's baseline SO_2 emissions are 23,000 tons
Asarco's baseline sulfur input is 235,000 tons

For example, in 2005:
Asarco's $S0_2$ emissions were 25,000 tons
Asarco's sulfur input was 250,000 tons.

Because Asarco's 2005 emissions and sulfur input exceeded it's baseline emissions and sulfur input: need to calculate the percent increase in sulfur input in the year 2005
= [(2005 sulfur input) - (baseline sulfur input)] ÷ [baseline sulfur input]
= [250,000 - 235,000] ÷ [235,000]

= [15,000] ÷ [235,000]
= 0.0638
= 6.38%

The adjustment to the milestone based on Asarco's increase in production is to increase the milestone by 1,564 tons of SO_2 (which is ok, since it is less than the maximum of 3,000 tons in Table 3 for Asarco).
adjustment = 6.38% x baseline emissions
adjustment = 6.38% x 23,000

(5) *Compilation of Reports.*

(a) The WRAP will compile the annual emissions reports submitted by all participating states and tribes into a draft regional emission report for sulfur dioxide. The WRAP will follow additional quality assurance procedures developed by states and tribes to identify possible errors in the emissions data, including screening for missing or added sources, name changes, and significant changes in reported emissions. Any questions or anomalies regarding Arizona's report will be resolved by the State of Arizona for resolution prior to the submission of the draft regional emission report.

(b) By December 31 of each year, the WRAP will submit the draft regional emission and milestone report to the State of Arizona and all participating states and tribes and will post the report on the WRAP's web page. The report will include the following information for all states and tribes that have an implementation plan that has been approved by the EPA Administrator under 40 CFR 51.309(h):

(i) Actual regional sulfur dioxide emissions in tons per year,
(ii) Adjustments to account for:
(A) changes in flow rate measurement methods,
(B) changes in emission monitoring or calculation methods, and
(C) enforcement actions or settlement agreements as a result of enforcement actions;
(iii) average adjusted emissions for the last three years for comparison to the regional milestone, if adjustments were made.
(iv) regional milestone adjustments to account for participation by eligible states and tribes and the future operation of smelters in Arizona and New Mexico. A separate report that includes additional states and tribes that have submitted implementation plans that are still under review by the Environmental Protection Agency will also be prepared for information purposes.

(6) The State of Arizona will evaluate the draft regional emissions report and will propose a draft determination that the sulfur dioxide milestone has either been met in the region, or has been exceeded. In the event that the TSA has not submitted a draft regional emissions and milestone report to the State of Arizona by the December 31 deadline for any year, the State of Arizona will prepare the report for that year based upon the annual emissions reports submitted by all participating states and tribes to the WRAP for that year. The State of Arizona will modify the data in these annual emissions reports, or use data where such report(s) have not been submitted, based upon direction received from the Environmental Protection Agency.

(7) The State of Arizona will advertise availability of the draft regional emissions report and will notify the public of the draft determination by publishing a notice in newspapers of general circulation

throughout Arizona. A 30-day public comment period will be established, and a public hearing will be held during the public comment period. The State of Arizona will also submit the draft determination to EPA for review and comment concurrently.

(8) The State of Arizona will consider any comments received during the comment period, and will submit a copy of all comments to the WRAP and to all participating states and tribes along with a response that addresses the comments.

(9) The WRAP will compile the comments and responses from all participating states and tribes and prepare a draft final regional emissions report. The report will be submitted to the states and tribes that are participating in the program and, if necessary, the report will propose a common program trigger date.

(10) The State of Arizona will review and approve the final regional emissions report. The State of Arizona will then submit this report to the Environmental Protection Agency along with a final determination that the milestone either has been met in the region, or that the milestone has been exceeded and the WEB Trading Program has been triggered in Arizona. This determination will be submitted to the Environmental Protection Agency by the end of March, fifteen months following the milestone year. The first determination will be submitted by March 31, 2005, for the 2003 milestone. If the milestone has been exceeded, the common trigger date proposed in the regional report will become the program trigger date for purposes of implementing the WEB Trading Program. In the event that the program trigger date must be established by the State of Arizona in the absence of a regional emissions and milestone report prepared by the WRAP, the program trigger date will be March 31 of the applicable year.

(11) The State of Arizona will publish a notice of the final determination in newspapers of general circulation throughout the state of Arizona. This notice will include the milestone and the final annual regional SO_2 emissions for that year. If the milestone has been exceeded, the notice will specify the program trigger date and the first year that WEB sources must be in compliance with the WEB Trading Program provisions.

8.1.4. Year 2013 Assessment

(1) Initial Assessment in 2013 Periodic SIP Review.

(a) The State of Arizona will work cooperatively through the WRAP with other participating states and tribes to develop a projected emission inventory for SO_2 through the year 2018, using the 2010 regional inventory as a baseline. This projected inventory will be included in the 2010 annual emission and milestone report that will be completed in March 2012 as outlined in section 8.1.3 of this plan.

(b) The State of Arizona will evaluate the projected inventory, and based upon this information will make an assessment of the likelihood of meeting the regional milestone for the year 2018. The State of Arizona will include this assessment as part of Arizona's progress report that must be submitted by December 31, 2013, as required by 40 CFR 51.309(d)(10).

(2) Regional Emissions Report for 2012.

(a) The State of Arizona will prepare an SO_2 emission report for the year 2012 by September 30, 2013, as described in section 8.1.3(1) of this plan. The State of Arizona will include a list of all known or anticipated sources in Arizona that are anticipated to affect total SO_2 emissions in 2018.

This may include permitted sources, projects that are still in the planning stage, or projections from the affected sources of anticipated emissions in 2018. The status of these projects will be described to provide a better understanding of the degree of certainty that individual projects will be completed by 2018.

(b) The WRAP will compile the information from all participating states and tribes, prepare draft SO_2 inventory projections for the year 2018, and estimate the effect of known future sources on SO_2 emissions. Projected 2018 emissions will be compared to the 2018 milestone. This information will be included in the draft regional emissions report for 2012 that will be submitted to the State of Arizona by December 31, 2013, as outlined in section 8.1.3(5) of this plan.

(3) Consensus Decision. The State of Arizona commits to meet with the participating states and tribes in March 2014 to discuss any comments received on the 2018 emission projections in the draft report. The participating states and tribes will decide, through a consensus process, whether it is necessary to trigger the WEB trading program early in order to meet the SO_2 emission reduction goals in 2018.

(4) Early Trigger: Timing. If the participating states and tribes unanimously decide in the March 2014 meeting that an early trigger of the backstop trading program is necessary, the State of Arizona will trigger the WEB Trading Program and the timing of the program elements will be adjusted as follows to ensure that the WEB Trading Program is in place in 2018.

(a) The date of the consensus decision by the participating states and tribes to voluntarily trigger the WEB trading program will become the program trigger date.

(b) Allowances for 2018 will be distributed to WEB sources by January 1, 2015.

(c) The first control period will be the year 2018. WEB sources will need to demonstrate at the end of the first control period that they have enough allowances to cover their 2018 SO_2 emissions.

(5) Public Notification. The State of Arizona will publish notice of the decision in newspapers of general circulation in Arizona. If applicable, the notice will include a statement that the WEB Trading Program is in effect and will specify the program trigger date.

8.1.5. Special Penalty Provisions for the 2018 Milestone

If the WEB Trading Program is triggered as outlined in the section 8.1 of this plan, and the first control period will not occur until after the year 2018, a special penalty shall be assessed for the exceedance of the 2018 milestone.

(1) The State of Arizona will allocate allowances to all WEB sources using the methods established in the 2013 SIP revision described in section 8.4 of this plan. WEB sources will have the option to buy and sell allowances during a two-month allowance transfer period.

(2) At the end of this two-month allowance transfer period, compliance with the allowance limitation will be determined. Penalties will be assessed for SO_2 emissions that are greater than the allowance limitation for each WEB source. However, SO_2 emissions in the year 2018 for each WEB source will be determined in accordance with the Sulfur Dioxide Milestone Inventory requirements.

(3) The 2018 special penalty provision shall continue to be applied each year after 2018 until the 2018 milestones have been achieved.

8.2. Pre-Trigger Emissions Tracking Requirements

8.2.1. SO_2 Emission Inventory

40 CFR 51.309 sets forth emissions inventory requirements for tracking compliance with the SO_2 milestones. Arizona's Article 3 (Permits and Permit Requirements) and Article 7 (Existing Stationary Source Performance Standards) in addition to the requirements of the state-specific WEB Trading Program rule, contain the inventory requirements to satisfy the needs of this program.

(1) Applicability. The sulfur dioxide milestone inventory requirements of R18-2-306 require all stationary sources with actual emissions of 100 tons per year or more of SO_2 in the year 2000, or in any subsequent year, to submit an annual inventory of SO_2 emissions, beginning with the 2003 emission inventory. A source that meets these criteria and then emits less than 100 tons per year in a later year must continue to submit an SO_2 inventory for tracking compliance with the regional SO_2 milestones until 2018 or until the WEB Trading Program has been fully implemented and emission tracking is occurring under the state-specific rule, whichever is earlier.

(2) Enforceable requirements for WEB sources as found in the state-specific rule.

(a) Each source shall submit an annual inventory of SO_2 emissions and smelters also must submit an annual report of sulfur input in tons per year.

(b) Each source shall use appropriate emission factors and estimating techniques and document the emissions monitoring or estimation methodology used.

(c) Each source shall include emissions from start up, shut down, and upset conditions in the annual total inventory.

(d) Each source subject to the federal acid rain program shall use methods from 40 CFR Part 75 to report emissions from all sources.

(e) Each source shall include the rate and period of emissions, the specific installation that is the source of the air pollution, composition of air contaminant, type and efficiency of the air pollution control equipment and other information necessary to quantify operation and emissions, and to evaluate pollution control.

(f) Each source shall retain records for a minimum of 10 years from the date of their creation, or if the record was the basis for an adjustment to a milestone, 5 years from the date of a SIP revision, whichever is longer.

(3) The State of Arizona will quality-assure the submitted inventory data as outlined in the Inventory Preparation Plan. The State of Arizona will screen the inventories to identify changes in emission measurement techniques that would require an inventory and milestone adjustment as outlined in section 8.1 of this plan.

(4) The State of Arizona will retain historical emission inventory records for non-utilities from 1996 and 1998 that may affect milestone calculations under section 8.1 of this plan and allocation decisions under section 8.1 of this plan until the year 2018 to ensure that changes in emissions monitoring techniques can be tracked.

8.2.2. Development of Emission Tracking System

The State of Arizona will work cooperatively with the states and tribes that are participating in the WEB Trading Program to ensure that an emission tracking system for the regional SO_2 inventory is developed and maintained.

8.2.3. Periodic Audit of Pre-Trigger Emission Tracking Database

(1) During the pre-trigger phase when the State of Arizona is tracking compliance with the regional SO_2 milestones, the State of Arizona will work cooperatively with the participating states and tribes to ensure that an independent audit of the tracking database is conducted to make sure that the WRAP is accurately compiling the regional emissions report.

(a) The first audit will occur during the year 2006 and will review data collected during the first two years of the program.

(b) Subsequent audits will occur in 2011, which will cover emissions years 2005-2009, and 2016, which will cover emissions years 2010-2014.

(2) The primary focus of the audit will be the process that is used to compile the regional inventory from the data provided by each state and tribe, and the tracking of accumulated changes during the period between SIP revisions. The audit will also review the accuracy and integrity of the regional reports that are used to determine compliance with the milestones. The audit will not be a full review of Arizona's process for compiling and reporting SO_2 emissions, but will include a broad review of Arizona's inventory management and quality assurance systems, including the presence and exercise of systems to assure data quality and integrity.

(3) The audit will discuss the uncertainty of emissions calculations, and whether this uncertainty is likely to affect the annual determination of whether the milestone is exceeded. It will identify any recommended changes to emissions monitoring or calculation methods or data quality assurance systems. It will also review and recommend any changes to improve the administrative process of collecting the annual emissions data at the state and tribal level, compiling a regional emission inventory, and making the annual determination of whether the WEB Trading Program has been triggered.

(4) Changes to the WEB trading program, including any changes to the milestones due to the results of these periodic audits, will be submitted to EPA as a SIP revision as part of the five-year SIP review required by 40 CFR 51.309(d)(10).

(5) The State of Arizona will advertise the availability of the draft audit report by publishing a notice in newspapers of general circulation in Arizona. A 30-day public comment period will be established, and a hearing will be held during the public comment period. The State of Arizona will respond to comments and provide notice of the availability of the final audit report. The State of Arizona will submit the final audit report to the EPA regional office.

8.3. WEB Trading Program Requirements

8.3.1. Initial Allocation of SO_2 Allowances

(1) Draft Allocation Report. Within six months of the program trigger date, as outlined in section 8.1.3(11) of this plan, the State of Arizona will submit a draft allocation report to all participating states and tribes and to the TSA. This report will contain the following information:

(a) A list of all WEB sources in Arizona as defined in the state-specific rule. Those sources are grouped into two categories:

(i) Category 1: WEB sources that commenced operation prior to January 1, 2003. These sources will receive a floor allocation and will be eligible for the reducible portion of the allocation.

(ii) Category 2: WEB sources that commenced operation on January 1, 2003 or a later date. These sources will receive a floor allocation, but will not be eligible for the reducible allocation. The floor allocation for Category 2 sources will be deducted from the new source set-aside.

WEB sources that have received a retired source exemption will be included in the allocation process in the same manner as WEB sources that are currently operating. However, sources that were permanently shut down prior to the program trigger date are not considered WEB sources and would therefore not be included in the allocation process.

(b) The floor allocation for all WEB sources in Arizona.

(i) For non-utility category 1 WEB sources, the floor allocation shall be as established in the E.H. Pechan Report, *Market Trading Forum Non-Utility Sector Allocation Final Report from the Allocations Working Group* (November 2002). The Pechan Report can be found in Appendix A-8a. If any additional category 1 sources are identified, the State of Arizona shall calculate a floor allocation using the methodology outlined in the E.H. Pechan Report.

(ii) For utility category 1 WEB sources, the floor will be calculated by first assigning a "clean unit" emission rate to each unit. The clean unit emission rate will then be multiplied by an annual heat input (MMBtu) that represents a realistic upper bound for the unit.

[**Note:** The floor level approach described above is designed to address equity issues regarding the allocation process for utilities. The State of Arizona is participating in ongoing discussions with the other participating states, tribes and regional stakeholders to ensure that all equity issues have been addressed.]

Principles

- Each unit will have enough allowances to operate as a clean source and at an operating rate (capacity factor) that is a realistic upper bound for the unit.
- There will not be significant winners and losers in this process.
- The focus is on a fair approach that is applied equally to all sources rather than on state and tribal budgets.
- The allocation process will use data that reflect current conditions, including current monitoring methodologies.

Equity Issues

- Sources that are currently burning very low sulfur coal may see changes in their supply in the future. Historic actual emissions may not reflect future operations.

- Sources that are currently operating at a low utilization may not reach full capacity in the future. Assumptions about growth that are realistic on the regional level may provide a windfall to some sources, and not provide adequate allowances for other sources.

- There are some utility units in the region that are not BART-eligible and are operating at a low level of control for SO_2. The relative responsibility of BART-eligible vs. non-BART-eligible is a consideration in the process.

- Sources that are operating at a high level of control are already bearing the cost of control and this affects their ability to compete in the market.

- Sources that have no SO_2 controls are facing a large expense that could affect their ability to continue to operate.

- Emission rate disparities exist throughout the region.

(iii) For Category 2 WEB sources the floor allocation shall be the lower of the permitted SO_2 annual emissions for the WEB source, or SO_2 annual emissions calculated based on a level of control equivalent to BACT and assuming 100% utilization of the WEB source.

(c) A list of certified early reductions, expressed as tons of SO_2. Early reductions will be calculated and certified as follows:

(i) Any WEB source that installs control technology and accepts new permit emissions limits that are, for a non-utility source, below its floor as established in this section, or, for a utility source, below BACT, may apply for an early reduction credit. The application must show that the floor was calculated in a manner that is consistent with the monitoring requirements and the new permit must contain monitoring requirements that are consistent with the state-specific rule. The credits accumulate from the time the new controls come on line until the program trigger date and will be allocated to the WEB source over a 10 year period. The use of early reduction credits in any control period is limited to no more than five percent, system-wide, of the existing available allowances, as provided in section 8.1.3(2)(f) of this plan.

(ii) The State of Arizona will review the application and will certify early reductions for each full year between 2003 and the program trigger year that meet the requirements of the state-specific rule and this plan.

(iii) A source's certified early reductions for all years will be added together to obtain the total certified early reductions for that source.

(d) A list of all renewable energy plants and sources in Arizona that began operation after October 1, 2000, and the MW of installed nameplate capacity for each of these resources. Renewable energy credits will be granted at a rate of 2.5 tons per MW, and will accumulate from the beginning of the facility's operation. Their use in any control period is limited to no more than five percent, system-wide, of the existing available allowances, as provided in section 8.1.3(2)(g) of this plan.

(e) Historical SO_2 emissions data for all Category 1 sources for the purposes of calculating the reducible allocation.

(i) For utilities, the average of the years 2000 – 2002. Another time period may be used for individual emission units, if needed, to be representative of normal operating conditions.

(ii) For non-utilities, the average of annual SO_2 emissions for the years 1996 and 1998.

(f) Changes due to enforcement actions or settlement agreements as a result of enforcement actions. The adjustment shall be determined in accordance with section 8.1.3 of this SIP. The difference between the WEB source's allocations prior to enforcement and after the enforcement action shall be removed from the allocation pool.

(2) Compiled Allocation Report.

The TSA will compile the information provided by all participating states and tribes into a draft regional allocation report, and will submit this draft regional report to the State of Arizona and all participating states and tribes for review and comment thirty days after receiving the preliminary allocation reports. The draft regional allocation report will include a proposed budget for each state and tribe and the proposed allocation for each WEB source in Arizona.

The following methodology for calculating the proposed regional allocation for utilities and non-utilities is based on the assumption that the states of Arizona, Oregon, New Mexico, Utah and Wyoming are the only participating states in the WEB Trading Program. These 5 states are actively pursuing a SIP under section 309 of the Regional Haze Rule and it is unlikely that any other states will be able to develop a SIP under section 309 by the deadline of December 31, 2003. The State of Arizona will work closely with the other four states that are developing 309 SIPs to ensure that the regional allocation is distributed consistently and fairly and to address any change in status that may affect this process. Tribal nations may participate in the program at a later date under the provisions of the Tribal Authority Rule. There are currently four category 1 sources operating on tribal lands under the jurisdiction of three tribal nations. The following methodology will remain unchanged if any of these tribal nations opt in to the program at a later date because the allocation for any of the four existing tribal sources will be covered by the opt-in adjustment for the tribe, and the allocation for any new sources will be covered by the regional new-source set-aside.

(a) Table 8-4 shows the calculation of the available allocation for existing sources. The base milestone for the 5-state region (i.e., those states currently committed to a SIP under Section 309; namely: Arizona, New Mexico, Oregon, Utah, and Wyoming) calculated in accordance with section 8.1 of this plan is the starting point. The base milestone does not include the smelter set-aside. 20,000 tons of SO_2 is then subtracted for a tribal set-aside.

Table 8-4. Utility/Non-utility Split.

	Base Milestone from Table 2	Tribal Set-Aside	New Source Set-aside	Remaining Allocation	Utility Portion	Non-utility portion
2003	446,904	20,000	6,390	420,514	275,027	145,488
2004	446,904	20,000	6,390	420,514	275,027	145,488
2005	446,904	20,000	6,390	420,514	275,027	145,488
2006	446,904	20,000	6,390	420,514	275,027	145,488
2007	446,904	20,000	6,390	420,514	275,027	145,488
2008	447,014	20,000	12,902	414,112	275,636	138,476
2009	447,123	20,000	12,902	414,221	275,708	138,513
2010	447,333	20,000	12,902	414,331	275,782	138,549
2011	447,333	20,000	12,902	414,331	275,782	138,549
2012	447,333	20,000	12,902	414,331	275,782	138,549
2013	435,455	20,000	19,370	396,085	259,171	136,914
2014	423,676	20,000	19,370	384,306	251,463	132,843
2015	411,898	20,000	19,370	372,528	243,757	128,771
2016	411,898	20,000	19,370	372,528	243,757	128,771
2017	411,898	20,000	19,370	372,528	243,757	128,771
2018	309,087	20,000	19,370	269,717	155,367	114,350

(b) Table 8-5 shows the new source set-aside for the 5-state region.

(i) The new source set-aside is calculated by subtracting the new source set-aside adjustment listed in Table 8-5 for all states and tribes that do not have a federally approved Implementation Plan for the WEB trading program under 40 CFR 51.309 as of the program trigger date from the maximum possible set-aside for each of the first five years of the trading program.

Table 8-5. New Source Set-Aside Adjustment

	2003 - 2007	**2008 - 2012**	**2013 - 2018**
Maximum Possible Set-Aside	9,000	18,000	27,000
State or Tribe	**Adjustment (tons/yr SO_2)**		
1. Arizona	1,757	3,596	5,437
2. California	559	1,039	1,532
3. Colorado	1,480	2,945	4,364
4. Idaho	270	496	721
5. Nevada	302	618	1,011
6. New Mexico	1,267	2,512	3,889
7. Oregon	393	795	1,075
8. Arizona	640	1,293	1,949
9. Wyoming	2,333	4,706	7,020
10. Tribes	No adjustment needed	No adjustment needed	No adjustment needed

(ii) Subtract the floor allocation for all WEB sources in the region that were identified as Category 2 from the new source set-aside for the 5-state region to determine the available allocation for new sources that begin operation after the program trigger date. The allocation process for these new sources is described in section 8.3.3 of this plan.

Example calculation of the new source set-aside.
The example uses the following assumptions:
(i) Emissions exceed the milestones based on an average of the years 2003-2005.
(ii) The program trigger date is March 31, 2007.
(iii) The first 5 years of the program are 2011-2015.
(iii) Five states are participating in the program (AZ, NM, OR, UT, WY).
(iv) New sources that commenced operation between January 1, 2003 and the program trigger date have a total floor allocation of 6,000.

	2011	**2012**	**2013**	**2014**	**2015**
Maximum Possible Set-Aside	18,000	18,000	27,000	27,000	27,000
5-State Adjustment	- 5,098	-5,098	-7,628	-7,628	-7,628
Floor for Category 2 Sources	-6,000	-6,000	-6,000	-6,000	-6,000
Remaining New Source Set-aside	6,902	6,902	13,372	13,372	13,372

(c) The remaining allocation shown in Table 8-5 is available for distribution to category 1 sources. The final two columns in Table 8-5 split this remaining allocation into a utility allocation and a non-utility allocation. Apply any milestone adjustments due to the smelter set-aside as outlined in section 8.1 of this plan to the non-utility allocation listed in Table 8-5.

(d) Subtract the floor allocations for all category 1 utility and non-utility sources in the region from the utility allocation or the non-utility allocation.

(e) Calculate the early reduction allocation.

(i) Divide the number of certified early reduction credits for all WEB sources in the region by ten.

(ii) Add the utility allocation for 2018 to the non-utility allocation for 2018 and then multiply this total by 0.05.

(iii) If the product of paragraph (i) is no more than the product of paragraph (ii), the product of paragraph (i) is the early reduction allocation, and each source is allocated ten percent of its early reduction credits.

(iv) If the product of paragraph (i) is more than the product of paragraph (ii), the early reduction allocation for the region is the product of paragraph (ii). To determine a source's allocation, divide the product of paragraph (ii) by 0.10 times the total number of early reduction credits and apply that ratio to the early reduction credits claimed by the source.

(v) Split the regional early reduction allocation based on the ratio of utility to non-utility allocations in 2018 and subtract the early reduction allocation from the utility and non-utility allocation totals.

(vi) The early reduction allocation will be calculated in a similar manner for the second five-year allocation period under this program, and will then be discontinued for any future allocation periods.

(g) Calculate the regional renewable energy allocation.

(i) Add together the reported MW of installed nameplate capacity for renewable energy facilities reported by the participating states and tribes, and then multiply this number by 2.5.

(ii) Add the utility allocation for 2018 to the non-utility allocation for 2018 and then multiply this total by 0.05.

(iii) If the product of paragraph (i) is no more than the product of paragraph (ii), the product of paragraph (i) is the renewable energy allocation.

(iv) If the product of paragraph (i) is greater than or equal to the product of paragraph (ii), the renewable energy allocation for the region is the product of paragraph (ii). To determine a source's allocation, divide the product of paragraph (ii) by the total number of renewable energy credits and apply that ratio to the early reduction credits claimed by the source.

(v) Split the regional renewable energy allocation based on the ratio of utility to non-utility allocations in 2018 and subtract the renewable energy allocation from the utility and non-utility allocation totals.

(h) Any remaining allowances in the utility allocation or the non-utility allocation after subtraction of the early reduction allocation and the renewable energy allocation is considered the reducible allocation and will be assigned to Category 1 sources.

(i) For non-utility sources, add together the historic SO_2 emissions in accordance with section 8.1.3(1)(e) of this plan for all Category 1 non-utility sources in the region to determine an historic emission total. Determine a percent contribution of SO_2 emissions for each WEB source to the historic emission total. Multiply the non-utility reducible allocation calculated in paragraph ((i)) below by the percent contribution for each WEB source to determine a reducible allocation for each WEB source.

(ii) For utility sources, the reducible allocation will be distributed to sources that emitted above their floor in the baseline period (2000 through 2002) based on their percentage of total floor emissions for sources emitting above the floor times the number of reducible allowances available for the first five years of the WEB Trading Program. The number of allowances for any source receiving a reducible allocation shall not exceed a recent historic emission rate times a heat input that represents a realistic upper bound for the unit.

[Note: The approach for distributing the reducible utility allocation described above is designed to address equity issues regarding the allocation process for utilities. The State of Arizona is participating in ongoing discussions with the other participating states, tribes and regional stakeholders to ensure that all equity issues have been addressed. The principles and equity issues that are under discussion are listed in section 8.1 of this plan.]

(i) Add together the floor allocation, early reduction allocation, renewable energy resource allocation, and reducible allocation for each WEB source and each renewable energy source to determine the proposed allocations for the first five years of the WEB Trading Program.

(j) Add together the proposed allocations for all of the WEB sources in the jurisdiction of each participating state and tribe to determine a draft SO_2 allowance budget for each state and tribe.

(3) Public Comment Period. The State of Arizona will publish notice of availability of the draft regional allocation report in newspapers of general circulation throughout Arizona. A 30-day public comment period will be established, and a hearing will be held during the comment period. The State of Arizona will consider the comments, and will revise the draft report as needed.

(4) Proposed Changes Submitted to Tracking System Administrator. The State of Arizona will submit proposed changes to the budget and source allocations to the TSA within sixty days of receipt of the draft regional allocation report.

(5) Compilation of Changes. The TSA will compile the proposed changes and will submit a final draft regional allocation report to the State of Arizona for approval within 30 days of receipt of the recommended changes.

(6) Final Regional Allocation Report. The State of Arizona will review the final regional allocation report and will determine the budget for Arizona and allocations for WEB sources within Arizona in accordance with the provisions of this plan within thirty days of receipt of the final draft allocation report. The State of Arizona will submit the budget and allocations for all WEB sources in Arizona to EPA, and will notify the TSA that the WEB source allocations should be recorded in the allowance tracking system.

(7) The State of Arizona will notify all WEB sources within Arizona of the number of allowances that have been recorded in their compliance account. The notice will include a warning to the WEB sources that reported annual sulfur dioxide emissions may change due to the implementation of new monitoring methods. Allocations for the first five years of the program will not be adjusted to account for changes due to the new monitoring method. However, allocations during the next five-year distribution will be adjusted as needed to account for paper changes in emissions due to changes in monitoring methodology.

8.3.2. Distribution of Allowances for Future Control Periods.

By December 1 of the year five years after the initial allocation, the State of Arizona will follow the process outlined in section 8.1 of this plan to distribute allowances for the next five-year period. This process will continue every five years until allowances have been allocated through the year 2018.

8.3.3. Distribution of the New Source Allocation

(1) The new source set-aside will be available for two categories of sources.

(a) A new WEB source is eligible to receive an annual allocation equal to the annual sulfur dioxide limit in the source's approval order, beginning with the first full year of operation and in accordance with the provisions of the state-specific rule.

(b) An existing WEB source that has increased production capacity by first obtaining a new approval order is eligible to receive an allocation from the new source set-aside equal to:

(i) the permitted annual sulfur dioxide emission limit for a new unit; or

(ii) the permitted annual SO_2 emission increase for the WEB source due to the replacement of an existing unit with a new unit or the modification of an existing unit that increased the production capacity of the WEB source.

The allocation from the new source set-aside in the first year of operation will be adjusted to account for the number of days that the source is operating in that first year.

EXAMPLE. A new unit with a nameplate capacity of 400 MW is constructed at a power plant with two existing units with nameplate capacities of 400 MW and 300 MW. The two existing units install SO_2 controls and reduce emissions to meet PSD requirements for the construction of the new unit. In this example, the source would continue to receive a floor and a reducible allocation for each of the existing units, and would also be eligible to receive an allocation from the new source set-aside for the new unit. Even though total SO_2 emissions will decrease at this plant due to the construction of the new unit, the allowances allocated to the source will increase to reflect the increase in production capacity of 400 MW of electricity. If the new unit comes on line on July 1 the allocation for the first year will be reduced by 50 percent because the unit was operational for half of the year.

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(2) Allocations from the new source set-aside will remain constant for the applicable WEB source and will be made on an annual basis by March 31 of each year for the current control period. When the next five-year allocation block is distributed as outlined in section 8.1 of this plan, all sources with an allocation under the new source set-aside will receive a five-year allocation block from the new source set-aside, and will continue to receive this allocation in future five-year allocation blocks.

(3) Owners or operators of new WEB sources or modified WEB sources that meet the eligibility requirements of (1) may apply for an allocation from the new source set-aside by submitting a written request to the State of Arizona.

(4) The State of Arizona will review the application for an allocation for accuracy and completeness, and will notify the source of intent to distribute allocations from the regional new source set-aside pending verification that allowances are available in the new source set-aside account. The State of Arizona will then forward the request to the TSA.

(5) The TSA will document the date that the request is received by the TSA. Requests for allocation of allowances from the new source set-aside will be processed in the order received. The TSA will deduct the number of allowances requested from the regional new source set-aside that was established by the participating states and tribes, and will then record an equal number of allowances in the source's compliance account for each remaining year of the five-year period. The TSA will then send

written notification to the source and to the State of Arizona that the allowances have been recorded in the source's compliance account.

(6) If there are insufficient allowances remaining in the new source set-aside to fulfill the request, the source must to purchase the allowances required to demonstrate compliance. Any eligible WEB source that does not receive an allocation from the new source set-aside because the set-aside was depleted will be first in line to receive an allocation when the new source set-aside is increased in the next five-year period as outlined in Table 8-5 of this plan. If there is more than one such source, their allocation requests will be processed in the order they were received by the TSA.

(7) A source that has received a retired source exemption and continues to receive an allocation as a retired WEB source is not eligible to receive an allocation from the new source set-aside.

8.3.4. Regional Tribal Set-aside

(1) Each year after the program is triggered, 20,000 allowances will exist as a tribal set-aside.

(2) The tribal caucus of the WRAP has stated its intent to determine the means for distributing the allowances among the tribes within one year after the program trigger date. The State of Arizona understands that there will be a process that will meet the tracking and data security requirements of the allowance tracking system by which a tribe will move its set-aside allowances into the trading program for the purposes of trading.

(3) The State of Arizona recognizes that the tribal set-aside allowances are bonus allowances for the tribes and, as such, are separate and additional to any allowances included in a tribal budget or the new source set-aside as outlined in the allocation report that is prepared in accordance with section 8.1.3(6) of this plan.

8.3.5. Opt-in Sources.

The WRAP Market Trading Forum has recommended including provisions in this plan that would allow smaller sources to opt in to the program. Opt-in sources may provide a more cost-effective way to reduce overall regional SO_2 emissions, and therefore may strengthen the market incentives of this program. While the benefits of allowing sources to opt in to the program are important, the program must also provide safeguards to ensure that the integrity of the program is not affected. For example, it would be counterproductive to allow sources that were already planning to shut down to opt in to the program and then sell allowances to an existing source. In this example, regional emissions could slowly creep upward in a manner that is not consistent with the goals of the SO_2 milestones.

The State of Arizona is deferring inclusion of provisions for opt-in sources until a future SIP revision to allow time to thoroughly consider how to provide the flexibility and potential benefits to the market by expanding the program while also ensuring that the SO_2 emission reduction goals are maintained.

8.3.6. WEB Allowance Tracking System (WEB ATS)

Section 40 CFR 51.309(h)(4)(v) requires a centralized system for the tracking of allowances and emissions. The centralized system will be referred to as the WEB Allowance Tracking System (WEB ATS or ATS). The WEB ATS must provide that all necessary information regarding emissions, allowances, and transactions is publicly available in a secure, centralized database. The ATS must ensure that each allowance is uniquely identified, allow for frequent updates, and include enforceable procedures for recording data.

The State of Arizona will work cooperatively with other states and tribes participating in the WEB Trading Program to designate this system. The State of Arizona will be responsible for ensuring that all the ATS provisions are completed as described in this plan.

The ATS will not exist unless the program is triggered. Prior to the implementation of the WEB Trading Program, a separate emissions tracking database will be employed to track the ongoing emissions of sources emitting SO_2 at amounts equal to or greater than 100 tons per year. The emissions tracking database, which was used to track and measure SO_2 emissions against the milestones, will still exist once the WEB Trading Program is triggered; however, it will become incorporated into the SO_2 Allowance Tracking System. Both the emissions tracking database and the ATS will be centralized systems and data will be posted in an electronic, Web-based program and available to all persons.

The participating states and tribes will contract with a common TSA to service and maintain the WEB ATS. It is envisioned that the ATS will require the use of a contracted consultant or database design engineer to create a secure, efficient and transparent tracking system. Because the ATS will be utilized by all states and tribes participating in the program, the design will require a uniform approach and level of security that will satisfy regional needs and concerns as well as meet the electronic, Web-based, access needs and security provisions. Due to the dynamic needs of the marketplace, the ATS will require a database that will reflect the current status of allowances and allowance transactions. The ATS will be operational within one year after the program trigger date.

Specifications of the WEB ATS such as emissions tracking, the recording of allowance transactions, account management, system integrity and transparency are outlined in Appendix A-8b to this Plan. Appendix A-8b and requirements found in the state-specific rule detail how a WEB source will register for the ATS and how the source will, through an account representative, establish accounts, transfer allowances, and track unused allowances from a previous year. The account representative will also look to Appendix A-8b to determine the appropriate interface with the ATS.

Neither the State of Arizona nor the TSA will adjudicate any dispute between the parties concerning the authorization of any account representative with regard to any representation, action, inaction, or submission of the account representative.

As an example of how the WEB ATS will generally function, once the WEB Trading Program is triggered, a WEB source will have its allowance allocation determined. At the same time, the WEB source's account representative will register for the ATS, and a compliance account will be established. Each allowance will be assigned a serial number. The allowance serial number will be used by the WEB ATS to track allowance allocations, transfers, and deductions, and to account for any unused allowances from a previous year. The serial number also will be assigned to each allowance recorded in a general account, which is an account for allowances that are not held to meet program compliance requirements. Furthermore, the ATS will track tribal allowance set-asides and new source allowance set-asides not yet assigned to either a compliance or general account.

It is important to note that while this plan has provided a design for and an operational understanding of the ATS, the components of the ATS will need to be examined and possibly altered upon each required SIP revision.

8.3.7. Allowance Transfers

(1) 40 CFR 51.309(h)(4)(viii) requires the Plan to include provisions detailing the process for transferring allowances between parties. Transfers are defined as the conveyance from one account to another account (compliance account or general account) of one or more allowances by whatever means, including but not limited to purchase, trade, or gift in accordance with the procedures established in the state-specific rule. This includes the transfer of allowances for the purpose of retirement. Once an allowance is retired, it is no longer available for transfer to or from any account. Allowances may be purchased by any person for the purpose of retirement.

(2) The TSA will have specific recording duties involving transfers. These required procedures will be detailed in the service contract and will include the following activities.

(a) Recording of Allowance Transfers.

(i) Within five business days of receiving an allowance transfer, except when the transfer does not meet the requirements of the state-specific rule, the TSA will record an allowance transfer by moving each allowance from the transferor account to the transferee account as specified by the request, provided that the transfer is correctly submitted and that the transferor account includes each allowance identified in the transfer.

(ii) Any allowance transfer that is submitted for recording following the allowance transfer deadline and that includes any allowances allocated for a control period prior to or the same as the control period to which the allowance transfer deadline applies will not be recorded until after completion of the compliance account reconciliation.

(iii) Where an allowance transfer submitted for allowance transfer recording fails to meet the requirements of the state-specific rule, the TSA will not record the transfer.

(2) Notification of the Recording of Allowance Transfers. The TSA has specific responsibilities involving the notification of the recording of any transferred allowances, including the failure to record any transfer of allowances. Again, these required procedures will be outlined in the service contract, but include the following.

(a) Within five business days of the recording of an allowance transfer, the TSA will notify the transferor's and transferee's account representatives of both accounts, and make the transfer information publicly available on the Internet.

(b) Within five business days of receipt of an allowance transfer that fails to meet the requirements of the state-specific rule, the TSA will notify the account representatives of both accounts of the decision not to record the transfer, and the reasons for not recording the transfer.

8.3.8. Use of Allowances from a Previous Year

(1) Background. 40 CFR 51.309(h)(4)(ix) allows states to include in the plan provisions for the accounting of unused allowances from a previous year. The unused allowances may be kept for use in future years and there are restrictions on the use of the allowances in accordance with the state-specific rule. The federal rule also requires that allowances kept for use in future years may be used in calendar year 2018 only to the extent that the plan guarantees that such allowances will not interfere with the achievement of the 2018 milestone as outlined in Table 3 of this plan, adjusted according to the provision

of sections 8.1.3(2) (3) and (4) of this plan. The state-specific rule addresses this by prohibiting the use after the year 2017 of allowances allocated for the years 2003 – 2017. This provision ensures that actual emissions will be less than the 2018 milestone because only allowances allocated for the year 2018 could be used to show compliance in that year. The provision also maintains flexibility by resetting the baseline to the year 2018 and then allowing sources to once again use extra allowances to show compliance in any future year. This flexibility is important for sources that have variable operations because the source may build up a reserve of unused allowances for use in a high production year.

The Annex explains the benefits of allowing the WEB source to use unused allowances from previous years, including increased flexibility and early reduction stimulus. The risk in allowing the use of allowances carried from a previous year could be an increase in emissions in later years as the unused allowances are withdrawn for compliance.

Because the regional haze SIP is based on reasonable progress requirements related to the remedying or prevention of any future visibility impairment, it is important to assure the use of these allowances will not interfere with attainment or maintenance of any reasonable progress goals. The safeguard employed here to mitigate this type of risk is termed, "flow control", and is described in paragraph (2) below.

(2) Flow Control Provisions.

(a) At the end of each control period, WEB sources may transfer allowances in and out of their compliance account for a period of 60 days to ensure that the account will contain enough allowances to cover sulfur dioxide emissions during the previous year. At the end of the sixty-day transfer period, allowances shall be deducted from the compliance account of each WEB sources in an amount equal to the sulfur dioxide emissions of that source during the control period.

(b) After the deductions have been completed, the Tracking System Administrator shall perform the following calculations and prepare a report according to 8.1.5 of this plan.

(i) Determine the total number of allowances remaining in the allowance tracking system that were allocated for the just completed control period and all previous control periods.

(ii) If the number calculated in (i) exceeds 10 percent of the milestone for the next control period, then the flow control procedures found in the state-specific rule shall be triggered for that next control period. These flow control provisions will discourage the excessive use of allowances that were allocated for an earlier control period without establishing an absolute limit on their use. WEB sources will maintain the option to use allowances allocated for an earlier control period, but will be required to use two allowances for each ton of SO_2 emissions. Flow Control operates as follows.

(A) The flow control ratio shall be calculated by multiplying 0.1 times the milestone for the next control period, divided by the total number of unused allowances remaining in the system.

(B) To calculate the number of prior-year allowances that can be used without restriction by a source for the next control period, the TSA shall multiply the prior-year allowances by the flow control ratio. The resulting number of allowances may be used on a one-to-one ratio to show compliance with the source's emission limitation.

(C) The remaining prior-year allowances may be used on a two-to-one ratio to show compliance. Thus, WEB sources will maintain the option to use allowances allocated for an earlier control period, but will be required to use two of those allowances for each ton of SO_2 emissions.

Example: On March 1, 2010 (the compliance transfer deadline for the 2009 control period) the Tracking System Administrator deducts allowances from the compliance account for each WEB source to cover 2009 SO_2 emissions from that source. After completing these deductions, the TSA reports the following information:

Total number of allowances still in the system for the years 2003 – 2009	=	75,000
2010 milestone (5-state, no smelter)	=	508,223
Percent of milestone	=	14.75 %

Because the number of allowances not used in previous control periods is greater than 10% of the milestone, flow control procedures are triggered. In the annual report required in XX.E.3.j(1)(6) the TSA will then calculate the flow control ratio for 2010:

0.1 x 2010 Milestone ÷ prior year allowances = flow control ratio
0.1 x 508,223 ÷ 75,000 = 0.67

On March 1, 2011 (the compliance transfer deadline for the 2010 control period) the TSA will apply the 2010 flow control ratio before deducting allowances from each WEB source's compliance account

WEB Source A		
2010 Allowances	=	1,000
Remaining Prior Year Allowances	=	500
2010 Emissions	=	1,400

In this example, the TSA would multiply the prior year allowances by 0.67 to determine the number of prior year allowances that could be used without restriction, at a one-to-one ratio. This would equal 335. The remaining prior year allowances would then be used at a 2:1 ratio. 130 allowances would be needed to cover the remaining 65 tons of SO_2 emissions. The TSA would therefore deduct a total of 1,465 allowances (1,000 + 335 + 130) to cover 1,400 tons of SO_2 emissions.

8.3.9. Monitoring/Recordkeeping

(1) For WEB sources subject to 40 CFR Part 75, the TSA shall use data that has been quality assured and finalized by the EPA. For WEB sources subject to a state-specific monitoring protocol, the State of Arizona will quality assure and finalize the data in accordance with these provisions for submission to the TSA.

(2) The data will be verified and submitted to the emissions tracking database as soon as reasonably feasible after annual emissions are reported by the WEB sources. These timelines will be modified, as necessary, according to the monitoring protocols.

8.3.10. Compliance and Penalties

(1) Compliance. When a WEB source exceeds its allowance limitation, the State of Arizona will require the TSA to deduct allowances from the following year's allocation in an amount equal to two times the WEB source's emissions of SO_2 in excess of its allowance limitation. This deduction will be made from the WEB source's compliance account after deductions for compliance are made. If sufficient allowances do not exist in the compliance account for the next control period to cover this amount, the State of Arizona will require the TSA to deduct the required number of allowances, regardless of the control period for which they were allocated, whenever the allowances are recorded in the account.

(2) Penalties. The amount of the financial penalty shall be evaluated at each five-year SIP review, and adjusted to ensure that penalties per ton exceed the expected cost of allowances to ensure that this remains a stringent penalty. The state-specific rule establishes a penalty of $5,000 per ton for each ton of emissions above the source's allowance limitation. This amount is in addition to the two allowances from the next year's allocation to be deducted from the account for each one allowance of exceedance. For a violation of any provision of the market trading program, each day of the control period is a separate violation under Arizona's rule, and each ton of excess emissions is a separate violation.

8.3.11. Periodic Evaluation of the Trading Program.

(1) Annual Report.

(a) Beginning one year after compliance with the trading program is required, the State of Arizona will obtain from the TSA an annual report that contains the following information:

(i) the level of compliance program-wide;

(ii) a summary of the use and transfer of allowances, both geographically and temporally;

(iii) a source-by-source accounting of allocations compared to emissions;

(iv) a report on the use of unused allowances from a previous year, in order to determine whether these emissions have or have not contributed to emissions in excess of the cap; and

(v) the total number of WEB sources participating in the trading program and any changes to eligible sources, such as retired sources, or sources that emit more than 100 tons of SO_2 after the program trigger date.

(b) Within 10 months after the allowance transfer deadline for each control period when compliance with the trading program is required, the TSA will prepare a draft report that lists:

(i) the total number of allowances deducted for the control period,

(ii) the total number of allowances remaining in the Allowance Tracking System allocated for that control period and any earlier control period,

(iii) a proposed determination that flow control procedures have either been triggered or have not been triggered for the next control period, and

(iv) if flow control procedures have been triggered, a draft flow control ratio calculated according to 8.3.8(2).

(c) The State of Arizona will evaluate the draft report, and will propose a determination that flow control procedures either have been triggered or have not been triggered for the next control period.

(d) The State of Arizona will publish a notice of availability of the draft report in newspapers of general circulation in Arizona, and will hold a 30-day public comment period.

(e) After the comment period the State of Arizona will make a final determination that the flow control procedures either have been triggered or have not been triggered for the next control period. If the flow control procedures have been triggered, the State of Arizona will notify all WEB sources in Arizona that flow control procedures will be in effect during the next control period.

(2) Five-year Evaluation.

(a) The State of Arizona will work cooperatively with other participating states and tribes to conduct an audit of the WEB Trading Program no later than three years following the first full year of the trading program, and at least every five years thereafter. This evaluation does not replace the Plan assessments in 2008, 2013, and 2018. The evaluation will be conducted by an independent third party and include an analysis of:

(i) whether the total actual emissions could exceed the values in Table 3 of this Implementation Plan of the WEB Trading Program even though sources comply with their allowances;

(ii) whether the program achieved the overall emission milestone it was intended to reach;

(iii) the effectiveness of the compliance, enforcement and penalty provisions;

(iv) a discussion of whether states and tribes have enough resources to implement the WEB Trading Program;

(v) whether the trading program resulted in any unexpected beneficial effects, or any unintended detrimental effects;

(vi) whether the actions taken to reduce sulfur dioxide have led to any unintended increases in other pollutants;

(vii) whether there are any changes needed in emissions monitoring and reporting protocols, or in the administrative procedures for program administration and tracking;

(viii) the effectiveness of the provisions for interstate trading, and whether there are any procedural changes needed to make the interstate nature of the program more effective; and

(ix) the integrity of the emissions and allowance tracking system, including whether the procedures for recording transactions are adequate, whether the procedures are being

followed and in a timely manner, whether the information on sources' emissions are accurately recorded, whether the emissions and allowance tracking system has procedures in place to ensure that the transactions are valid, and whether back-up systems are in place to account for problems with loss of data.

(b) The public will have an opportunity to participate in this trading program evaluation.

(c) In the event that any audit results in recommendations for program revisions, the State of Arizona, in consultation with the WRAP, will make appropriate modifications to this Plan. The State of Arizona will revise this Plan if the program is not meeting its emission reduction goals.

(d) The State of Arizona will submit a copy of the report to the EPA regional office.

8.3.12. Retired Source Exemption

The state-specific rule outlines the procedure that a WEB source must follow to receive a retired source exemption. The exemption would allow the source to continue to receive an allocation, but would exempt the source from monitoring and recordkeeping requirements that would serve no useful function for a source that has ceased operations. The State of Arizona (i.e., the Director) will notify the source of its obligation to apply for a retired source exemption upon the cancellation or relinquishment of a permit.

To receive a retired source exemption, the source must submit a request for the exemption to the State of Arizona. The State of Arizona will review this request, and within 60 days of receipt of the request will notify the source that the retired source exemption has been granted or has been rejected. If the exemption has been rejected, the notification will contain an explanation of the reasons for rejecting the request.

The TSA will record an allocation to a WEB source that has received a retired source exemption. However, the allowances will be recorded in a general account rather than a compliance account for the source.

A WEB source that is permanently retired and that does not request a retired source exemption will forfeit all abandoned allowances in that source's compliance account. The forfeited allowances will not be redistributed to other sources, and will be permanently retired from the Allowance Tracking System. During the next five-year allowance distribution period the retired source will not receive an allocation, and the allowances that would have been distributed to that source will be added to the new source set-aside.

8.3.13. Integration into Permits

40 CFR 51.309 requires that the requirements for emissions reporting and for the trading program be incorporated into a permit that is enforceable as a practical matter by EPA and by citizens to the extent permitted by the Act. It is expected that all WEB sources will at least initially be subject to Arizona's Title V permitting requirements. Arizona's delegated Title V permitting program, the pre- and post-trigger requirements of the market trading program fall under the definition of "applicable requirements", and will be incorporated into each source's Title V permit. As found in the state-specific rule, any source that for any reason and at any time is not required to have a permit under the requirements of the state-specific rule, must obtain a New Source Review permit that incorporates the same requirements. Both types of permits are enforceable both federally and by citizens pursuant to Arizona's SIP.

8.4. 2013 SIP Revision; Backstop for Beginning of Second Planning Period

In addition to the requirements of 40 CFR 51.309(d)(10), the periodic SIP revision due in 2013 will include the following information:

a. Source specific allocations for all WEB sources in Arizona for the year 2018; and

b. Either the provisions of a program designed to achieve reasonable progress for stationary sources of SO_2 beyond 2018 or a commitment to submit a SIP revision containing the provisions of such a program no later than December 31, 2016. The program will ensure that the requirements of 40 CFR 51.309 for the first planning period, including requirements that cannot be measured until after 2018, such as the determination of compliance with the 2018 milestone.

This 2013 SIP revision will provide certainty to sources regarding their potential liability under the special penalty provisions for the year 2018 outlined in section 8.1.5 of this plan. The calculation of these allocations is delayed until 2013 to provide certainty about the number of sources that will qualify as WEB sources at that time; the allocations needed for new sources in the region, and the magnitude of renewable energy development and early reductions that will be included in the allocation process. It is difficult to estimate the impact of these factors in 2003 because circumstances may change during the next 10 years.

If the 2018 milestone is not met, the starting point for the next planning period shall be the 2018 milestones, not actual emissions in 2018.

8.5 Geographic Enhancement Program

The requirements for geographic enhancement are discussed on page 35757 in the Preamble to the RHR (64 FR 35714, July 1, 1999). These requirements are related to Section 51.309(f)(1) which describes requirements for the Annex. The Annex allows states to submit a SIP, or tribes a TIP, which adopts an alternative measure to regional haze BART. Geographic enhancement is a voluntary approach that can be included in the Annex for addressing reasonably attributable visibility impairment (RAVI) for stationary sources, under the provisions of Section 51.302(c). RAVI is different from regional haze in that it addresses "hot spots" or situations where visibility impairment in a Class I area is reasonably attributable to a single source or small group of sources in relatively close proximity to the Class I area. The geographic enhancement approach would allow states or tribes to use the efficiencies and reduced cost provided by the market trading program in the Annex to accommodate situations where RAVI needs to be addressed. Additional information is contained in the WESTAR report, *Recommendations for Making Attribution Determinations in the Context of Reasonably Attributable BART*,[17] contained in Appendix A-8c.

(a) Procedure for addressing Reasonably Attributable Visibility Impairment under the Regional Haze Rule. Pursuant to 40 CFR 51.309(f)(4), the State of Arizona shall use the following process to address reasonably attributable impairment (RAVI) in any Class I area, and the potential need for Best Available Retrofit Technology (BART), as specified in 40 CFR 302(c):

(1) The State of Arizona will work with the National Park Service of the Department of Interior, and the U.S. Forest Service of the Department of Agriculture, on the agreed upon principles that will be followed for addressing RAVI within the context of regional SO_2 milestones and a backstop emission trading program that have been developed to address regional haze. As part of

[17] WESTAR , "Recommendations for Making Attribution Determinations in the Context of Reasonably Attributable BART", report to WRAP, [Date]

the Federal Land Managers' obligation to protect the visibility in the areas that Congress has designated as mandatory Class I Federal areas, in the course of certifying impairment, the National Park Service or U.S. Forest Service may make recommendations to the State of Arizona regarding a source or sources to which impairment may be reasonably attributable. Within the context of established regional milestones for SO_2 and a backstop trading program, the National Park Service and U.S. Forest Service will use the following screening process in making these recommendations as part of the certification process:

(i) The National Park Service or U.S. Forest Service determines that sulfate concentrations are not decreasing since the year 2000, based on ambient monitoring, and

(ii) There are BART-eligible sources of sulfur dioxide within 150 km of the mandatory Federal Class I area, and

(iii) The BART-eligible sources have not installed control technology to reduce sulfur dioxide emissions at a rate equivalent to capture of 85% of potential annual emissions.

(2) In approximately 2009 to 2010, but no later than December 2010, the State of Arizona will conduct a public meeting to facilitate the exchange of information regarding current visibility monitoring data at Class I areas in Arizona or in nearby states within 100 miles of any BART-eligible sources located in Arizona. The purpose of the meeting will be to provide as much information as possible to all interested parties about the potential for a certification to occur. The information will include visibility trends, as well as the type of impairment that is occurring at individual areas (e.g., haze, episodic impairment, and other types of screening criteria). The goal of this meeting is to provide information to sources and to the trading market so that potential problems could be addressed in the most cost-effective manner.

(3) If the National Park Service or U.S. Forest Service certifies impairment, the State of Arizona will fulfill its obligation to determine attribution and if necessary determine BART for the applicable source or group of sources in accordance with Arizona's SIP for visibility protection submitted to EPA in Chapter 5 of this Implementation Plan.

(i) The WESTAR report titled *Recommendations for Making Attribution Determinations in the Context of Reasonably Attributable BART*, contained in Appendix A-8c, periodically augmented by new techniques and information available at the time of review, will be used to provide a toolbox of appropriate technical criteria and techniques for determining attribution.

(ii) If attribution is determined, then the following alternative remedy solutions will be considered when determining BART for the applicable source:

(A) BART-level controls could be installed on the attributed source or group of sources;

(B) SO_2 emission reductions that may be more cost-effective or have other air quality benefits could be required at nearby sources in lieu of, or in combination with controlling the attributed source to achieve greater visibility improvements that the application of BART.

9. LONG-TERM STRATEGY FOR MOBILE SOURCES

9.1. Regulatory History and Requirements

In its June 1996 Report, the GCVTC recommended EPA move forward on new national vehicle emission and fuel standards to reduce emissions from mobile sources. The GCVTC also recommended other regional and local strategies be considered to manage mobile source emissions. One of the local strategies was to establish emission budgets for those pollutants in urban areas shown to significantly contribute to visibility impairment in any of the 16 GCVTC Class I areas. The budget caps were to be set at the 2005 emission levels.

When EPA finalized the RHR in July 1999, the rule acknowledged the GCVTC recommendations related to national vehicle emission and fuel standards. EPA included a status of planned actions on those recommendations as of July 1999 (Preamble to the regional haze rule, 64 FR 35753). EPA noted these new measures were over and above those included in the RHR for mobile sources that simply required a cap on emissions in significantly contributing urban areas at the 2005 level. EPA also indicated that emission reductions resulting from new standards adopted after the RHR was approved would be creditable toward reasonable progress. EPA also committed to work with the states if new national standards impacted the efficacy of regional or local strategies.

After the RHR rule was finalized, EPA established new standards for on-road vehicle emission and fuel standards (65 FR 6698). As a result, current mobile source emission projections developed by WRAP for the GCVTC Transport Region indicate overall mobile source emissions will decline continuously from 2003 through the end of the SIP planning period in 2018, which exceeds the level of emission reductions that EPA approved as meeting reasonable progress; i.e., holding mobile source emissions from major urban areas to their lowest level during the planning period. In addition, new standards for non-road vehicles were proposed by EPA on April 15, 2003, and are expected to be finalized in the near future. These new standards for non-road vehicles will further reduce overall mobile source emissions.

At the April 2003 WRAP Board meeting, the WRAP approved a recommendation that EPA modify the RHR eliminating the current requirements related to mobile source emission significance determination and budgets for urban areas (40 CFR 309(d)(5)), and replace those requirements with a new requirement focused on tracking mobile source emission reductions resulting from national standards to assure reasonable progress. This action was based on the finding that emissions of all pollutants from on-road and non-road mobile sources, except for sulfur dioxide from non-road engines, are expected to decline significantly through 2018. The overall emission trends for mobile sources are summarized in Table 9-1 contained in Section 9.2, below, with additional details contained in Chapter 5 of the WRAP TSD. If EPA adopts new low-sulfur standards for non-road mobile sources, then non-road mobile source sulfur dioxide emissions would also decline dramatically through 2013 with a very small increase expected through 2018.

On July 3, 2003, EPA issued a proposed rule (68 FR 39888) and a direct final rule (68 FR 39842) to amend the mobile sources provision of the Regional Haze Rule consistent with the recommendations of the WRAP. One adverse comment was received, so the direct final rule was withdrawn. On December 22, 2003, EPA promulgated the final rule (68 FR 71009) changing the mobile source requirements in 40 CFR 51.309. The revisions changed the requirements under 40 CFR 51.309(d)(5)(i) and eliminated the previous requirements under 40 CFR 51.309(d)(5)(ii & iii) for setting mobile sources emissions budgets using the lowest projected level as a planning objective and performance indicator for each urban area.

The former 40 CFR 51.309(d)(5)(iv), which addresses the other GCVTC mobile source recommendations, was retained as 40 CFR 51.309(d)(5)(ii). The new Section 51.309(d)(5)(i)(A) requires statewide inventories of mobile source emissions, for each 5-year implementation plan reporting period required under 40 CFR 51.309(d)(10), to be reviewed to demonstrate a continuous decline in emissions of each pollutant of concern over the planning period through 2018. Should mobile source emission not decline as expected, the State of Arizona will review control options for mobile sources and determine if additional controls are needed, consistent with the criteria for reasonable progress. If the State of Arizona determines that additional controls are needed, Arizona will prepare a revision to the implementation plan within one year after the progress report is due under 40 CFR 51.309(d)(10)(i), as required under 40 CFR 51.309(d)(10)(ii)(D).

In addition to the new revisions to 40 CFR 51.309(d)(5)(i) and the elimination of the former Sections 51.309(d)(5)(ii) and (iii), a backstop provision as outlined by the WRAP was added. The new 40 CFR 51.309(d)(5)(i)(B), requires the State of Arizona to assess the need for any long-term strategies to address SO_2 from non-road mobile sources by no later than December 31, 2008. Under this provision, Arizona will determine if a SIP revision is necessary to address SO_2 from mobile sources by considering whether the emission reductions anticipated or achieved by any Federal standards in place addressing fuel sulfur content for non-road engines are sufficient to meet reasonable progress.

To assist in the investigative and deliberative process related to mobile source emissions and their significance, ADEQ established a Mobile Source Work Group (MSWG) made up of a wide range of Arizona stakeholders including industry, environmental, metropolitan planning organization representatives, and regulators. The MSWG monitored the WRAP Mobile Source Forum process and work products. In addition, the MSWG collected and analyzed data to assist in the deliberative process. The MSWG provided ADEQ tabular information on projected emissions in addition to recommendations for the mobile source regional haze SIP component. The MSWG issued a final memoranda summarizing findings and recommendations to ADEQ that are contained in Appendix A-9a, entitled "Arizona Mobile Source Work Group Findings and Recommendations Related to Mobile Source Emissions."

9.2. Inventory of Current and Projected Emissions from Mobile Sources

(a) Inventory of Current and Projected Emissions from Mobile Sources. Pursuant to 40 CFR 51.309(d)(5)(i)(A), the State of Arizona, in collaboration with the WRAP, assembled a comprehensive statewide inventory of mobile source emissions. This is summarized in Table 9-1, and is described in detail in the WRAP TSD in Chapter 1 and Chapter 5. This emission inventory showed the year with the lowest level of emissions would be at the end of the SIP planning period in 2018 instead of 2005 as anticipated by the GCVTC. The substantial reduction of projected mobile source emissions from 2003 to 2018 is due to the adoption of new on-road vehicle emission and fuel standards by EPA. The figures in Table 9-1 do not include the anticipated reduction from the pending proposal to reduce sulfur content of non-road sources.

Table 9-1. Statewide Mobile Source Emissions for Arizona (Tons per Day)

Year	VOC	NOx	$PM_{2.5}$	SO_2	Total
1996	553.2	655.0	37.2	33.3	1,278.7
2003	448.7	496.5	23.0	20.9	989.1
2008	319.9	381.2	22.0	10.0	733.1
2013	256.9	296.7	19.1	9.5	582.2
2018	222.0	237.3	18.0	18.6	495.9

Source: 1996 from WRAP 1996 Base Emission Inventory
2003-2018 from WRAP Mobile Source Worksheets

(b) Program to assure continuous decline in mobile source emissions. Pursuant to 40 CFR 51.309(d)(5)(i)(A), the State of Arizona commits to monitoring the emissions from mobile sources to assure a continuous decline in emissions as defined in 40 CFR 51.309(b)(6). If Arizona determines that a continuous decline in emissions is not being achieved, additional control measures will be reviewed to determine if they are needed to demonstrate reasonable progress. If Arizona determines such measures are needed, Arizona will submit an SIP revision to address the identified control measures.

(c) Backstop provision to address potential increase in non-road emissions in the event proposed Federal standards are not finalized. Pursuant to 40 CFR 51.309(d)(5)(i)(B), the State of Arizona commits to provide for a SIP revision no later than December 31, 2008, containing long-term strategies necessary to reduce emission of SO_2 from non-road mobile sources consistent with the goal of reasonable progress. The need for a SIP revision will be determined by a consideration of the emission reductions achieved or anticipated to be achieved by proposed Federal standards should those standards addressing fuel sulfur content for non-road engines not be in place.

9.3. Other GCVTC Strategies for Mobile Sources

Pursuant to 40 CFR 51.309(d)(5)(ii), the State of Arizona has reviewed the other mobile source recommendations contained in the GCVTC report. The results of that review are included in Chapter 13 of this SIP that addresses all recommendation of the GCVTC report, including mobile source recommendations.

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10. LONG-TERM STRATEGY FOR FIRE PROGRAMS

10.1. Regulatory History and Requirements

In its 1996 final report, the GCVTC recognized that past land management practices, including decades of fire suppression, have led to an increase of accumulated forest fuels. Wildfires are becoming larger in size, unnaturally destructive, and more dangerous and costly to control. Fire, however, is a component of most natural ecosystems in the West and therefore must be a component of processes to meet land management, human health and visibility objectives. The GCVTC recognized that prescribed fire and wildfire levels are projected to increase significantly for decades to come, and that programs to minimize emissions and visibility impacts, and to educate the public, should be implemented.

The Regional Haze Rule (40 CFR 51.309(d)(6)) requires documentation that all federal, state and private prescribed fire programs in the state evaluate and address the degree of visibility impairment from smoke. In addition, a statewide inventory and emissions tracking system must be established for volatile organic compounds, nitrogen oxides, elemental and organic carbon, and fine particle emissions from fire. Any administrative barriers to the use of alternatives to burning should be identified and removed where possible along with an enhanced smoke management program based on specific criteria that addresses visibility as well as health and nuisance objectives. Finally, annual emission goals for fire shall be established, in cooperation with states, tribes, federal land managers and private entities, to minimize emissions increases from fire to the maximum extent feasible.

The WRAP's effort to document and understand the incidence of fire and its effect on visibility in Class I areas has been extensive and productive. Chapter 6 of the WRAP TSD, "Assessment of Fire Programs," details the results of WRAP's analyses of fire on visibility to date. Different emission reduction scenarios for the 2018 projected inventories were the basis for the analyses. WRAP modeling shows that emissions from fire will continue to affect visibility for some time on an episodic basis.

10.2. Prescribed Fire Program Evaluation

Pursuant to 40 CFR 51.309(d)(6)(i), the State of Arizona evaluated the State's Enhanced Smoke Management Plan and all Federal, State, and private prescribed fire smoke management programs in the State, based on the potential to contribute to visibility impairment in the 16 Class I areas of the Colorado Plateau, and how visibility protection from smoke is addressed in planning and operation. The State of Arizona relied upon the WRAP report *Assessing Status of Incorporating Smoke Effects into Fire Planning and Operations* (see Appendix A-10a) as well as EPA's *Interim Air Quality Policy on Wildland and Prescribed Fires* (see Appendix A-10b) as a guides for making this evaluation along with input from a stakeholder-based work group familiar with the policies and regulations related to fire and land management within the State. The State of Arizona also evaluated whether the State's existing fire regulations as part of an Enhanced Smoke Management Plan contained the following elements: actions to minimize emissions; evaluation of smoke dispersion; alternatives to fire; public notification; air quality monitoring; surveillance and enforcement; and program evaluation. The result of this evaluation process was the determination that revisions to Arizona's existing fire regulations, R18-2-602, "Unlawful Open Burning," and Article 15, "Forest and Range Management Burns," would be necessary.

10.3. Emission Inventory and Tracking System

The State of Arizona has made revisions to R18-2-602, "Unlawful Open Burning," and Article 15, "Forest and Range Management Burns," to allow for the tracking of all types of fire in the State.

These state-approved rules along with the related public participation and review process, can be found in Appendix A-10c, with Appendix A-10d containing supporting information related to the promulgation of these rules. Most of the changes made to Article 15 relate directly to the requirement of Section 309(d)(6), including to the collection and recording of burn data. Changes to R18-2-602 allow Arizona to meet the tracking requirements in 12 counties throughout the state. The three remaining counties, Maricopa, Pima and Pinal, have their own fire rules (Maricopa County Rule 341; Pima County Rule 17.12.480, et seq.; and Pinal County Rule 3-8-700 and 3-8-710.). The three counties will revise their existing rules to comply the requirements of R18-2-602. The State of Arizona commits to submit updated county rules based on the revised Arizona rules in a SIP revision by December 31, 2004.

In addition to its own emissions tracking, the State of Arizona will review the WRAP data on post-burn activity and utilize the WRAP's regional emission tracking system. In addition, fire emission inventory updates will be provided in future progress reports, as part of the periodic SIP revisions, pursuant to 40 CFR 51.309(d)(10). See Appendix A-10e, entitled, *Policy on Fire Tracking Systems* for further information on the emissions inventory and tracking system to be utilized by Arizona.

10.4. Strategy for Use of Non-burning Alternatives

The State of Arizona is continuing to develop a process with key public and private entities, including the State Department of Agriculture, State Land Department, Federal Land Managers', farming and forestry associations, etc. to identify and remove administrative barriers to the use of non-burning alternatives to prescribed fire on federal, state, and private lands, pursuant to 40 CFR 51.309(d)(6)(iii). The process is collaborative and provides for continuing identification and removal of administrative barriers, and considers economic, safety, technical and environmental feasibility criteria, and land management objectives. This process is outlined in the related sections of the Arizona fire rules (see Table 10.1, "Alternative to fire"). In developing this process, the State of Arizona will rely on two documents: (1) *Nonburning Alternatives for Vegetation and Fuel Management* (see Appendix A-10f), and (2) *Burning Management Alternatives on Agricultural Lands in the Western United States* (see Appendix A-10g), prepared by the WRAP that describe a variety of non-burning alternatives and methods of assessing their potential applicability.

10.5. Enhanced Smoke Management Program

Pursuant to 40 CFR 51.309(d)(6)(iv), the smoke management programs that operate within Arizona are consistent with the WRAP *Enhanced Smoke Management Programs for Visibility* (see Appendix A-10h). This approach calls for programs to be based on the criteria of efficiency, economics, law, emission reduction opportunities, land management objectives, and reduction of visibility impacts. The WRAP *Enhanced Smoke Management Programs for Visibility* lists the previously identified elements under 40 CFR 51.309(d)(6)(i) as well as adding "burn authorization" and "regional coordination" elements to ensure visibility protection and to meet the designation of "enhanced."

An Enhanced Smoke Management Plan (ESMP) comprises a series of key policies and management practices. In general the ESMP must specifically address visibility effects and apply to all fire sources as do all smoke management plans in the State of Arizona. The ESMP should also apply uniformly to source sectors or be tailored to source sectors and/or geographical areas. In addition, the ESMP must provide the opportunity to work collaboratively with state, tribal, local, and federal agencies, and private parties while considering the criteria of efficiency, economics, law, emission reduction opportunities, land management objectives, and reduction of visibility impact. The State of Arizona

ESMP meets all of these requirements. The State of Arizona will conduct annual meetings of all affected parties to discuss smoke management issues and objectives.

Arizona's Article 15 (R18-2-1501-1515), Forest and Range Management Burns, and R18-2-602 (Section 602), Unlawful Open Burning, upon revision now includes the following specific elements required of an ESMP, and are enumerated in the Table 10-1.

Table 10-1. Inclusion of ESMP Elements Into Arizona Regulations

Enhanced Smoke Management Plan Element	Rule Citation
Actions to minimize emission from fire	R18-2-1509 R18-2-602(D)(3)(e)
Evaluation of smoke dispersion	R18-2-1506 and 1510 R18-2-602(D)(3)(m) and (o) R18-2-602(B)(3)(d)
Alternative to fire	R18-2-1503(C)(8), 1503(D) and 1503(G) R18-2-602(H)*
Public notification of burning	R18-2-1513 R18-2-602(D)(3)(g)
Air quality monitoring	R18-2-1508 and 1511 R18-2-602(H)*
Surveillance and enforcement	R18-2-1514 R18-2-602**
Program evaluation	R18-2-1503 R18-2-602(H)*
Burn Authorization	R18-2-1505 and 1508 R18-2-602(D)(3)(g)
Regional Coordination	R18-2-1513 and 1515 R18-2-602(H)*

* R18-2-602(H) allows the State of Arizona to examine at its annual meeting any need to address monitoring, regional coordination, or alternatives to burning as they arise in an overall discussion of program evaluation for unlawful opening burning. Issues that could arise in these areas are difficult to determine ahead of time, and are driven by proximity and volume.

** Any violations under R18-2-602 have penalty authority under Arizona Revised Statute 49-501. A copy of ARS 49-501 can be found in Appendix A-10i.

10.6. Annual Emission Goal

Pursuant to 40 CFR 51.309(d)(6)(v), efforts will be made within the State of Arizona to minimize emission increases in fire, excluding wildfire, to the maximum extent feasible, through the use of annual emission goals, in accordance with the WRAP *Annual Emission Goals for Fire* (see Appendix A-10j).

The *Annual Emission Goals for Fire* recognizes that Emission Reduction Techniques (ERTs) can be used to minimize emissions from fire. The State of Arizona commits to the establishment of a collaborative mechanism for setting annual emission goals, and development of a process for tracking their attainment on a yearly basis. The authority to proceed with this commitment can be found in Arizona's revised Article 15, subsection 1503 and 1509. It can also be found in the tracking timeline

contained within Arizona's revised R18-2-602 rule. A list of current ERTs is contained in the rule appendix to R18-2-602.

The projection and tracking of ERT use is a minimum element of the quantifiable annual emission goal. The Annual Emissions Goal will utilize the projection of total emissions inventory for prescribed fire and agricultural burning, as provided by the emissions inventory and tracking systems outlined in Section 10.3 of this chapter, such that the effect of projected emission reduction techniques or percentage of ERT use is shown in relation to projected total emissions. Should projected annual emissions not be available, the State commits to submit a timeline to develop the necessary inventory. Where ERT use or other emission reduction methods cannot be quantified with confidence due to the current state of the science (such as for agricultural burning), the State of Arizona commits to participate in the development of further refinements in emission reduction or emissions averted calculation methodologies.

The use of ERTs to meet the 51.309(d)(6)(iv) requirement, as with the ESMP, is subject to economic, safety, technical and environmental feasibility, and land management objectives.

11. AREA SOURCES OF DUST EMISSIONS FROM PAVED AND UNPAVED ROADS

11.1. Regulatory History and Requirements

In its 1996 report to EPA *Recommendations for Improving Western Vistas* the GCVTC stated that dust emissions from vehicles traveling on paved and unpaved roads are generally near-field transport issues rather than long-range transport issues, especially with respect to larger, coarse materials that settle out of the atmosphere before being transported long distances. Due to considerable uncertainty regarding the ability of emission and air quality models to accurately characterize the contribution of road dust to visibility impairment, the GCVTC also recommended further analysis to resolve the uncertainties regarding both near-field and distant effects of road dust prior to recommending any remedial actions.

As a result, the Regional Haze Rule (40 CFR 51.309(d)(7)) requires states to assess the impact of dust emissions from paved and unpaved roads on regional haze in the 16 Class I areas located on the Colorado Plateau in the SIPs due by December 31, 2003. The WRAP, the GCVTC's successor organization, analyzed this issue, including efforts to improve methods for estimating road dust emission inventories as applied to regional scale modeling and characterization of transport and deposition. The WRAP's modeling work demonstrated road dust is not a measurable contributor on a regional level to visibility impairment in the 16 Class I areas. Due to this finding, no additional road dust control strategies are needed in the current SIP. The State of Arizona, in consultation with the WRAP, will perform further assessments of road dust impacts on visibility in the 16 GCVTC Class I areas in the progress updates and status reports due in 2008, 2013 and 2018. Based on these assessments, if road dust emissions are determined to be a significant contributor to visibility impairment, the State of Arizona commits to implement emissions management strategies to address the impact as necessary and appropriate to demonstrate reasonable progress.

11.2. Strategy for Road Dust Sources

Impact of paved and unpaved road dust emissions and contribution to visibility impairment finding. Pursuant to 40 CFR 51.309(d)(7), a regional scale assessment was made by the WRAP of the impact of dust emissions from paved and unpaved roads from transport region states on the 16 Class I areas of the Colorado Plateau. Chapter 7 of the WRAP TSD contains the results of the following technical work: (1) a summary of 1996 and 2018 emission inventories for re-entrained road dust from paved and unpaved roads; (2) a description of the definition of significance for road dust in the 16 Class I areas; (3) road dust modeling results – regional versus localized air quality impacts; and (4) a discussion of WRAP's finding of no measurable contribution to regional haze. Based on these findings, no emission management strategies have been identified at this time.

Tracking of Road Dust Emissions. The State of Arizona commits to track road dust emissions with the assistance of the WRAP, and provide an update on paved and unpaved road dust emission trends, including any modeling or monitoring information regarding the impact of these emissions on visibility in the Colorado Plateau 16 Class I areas. These updates shall include a re-evaluation of whether road dust is a measurable contributor to visibility impairment. These updates shall be part of the periodic SIP revisions, pursuant to 40 CFR 51.309(d)(10).

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12. POLLUTION PREVENTION AND RENEWABLE ENERGY PROGRAMS

12.1. Regulatory History and Requirements

In its 1996 Report, the GCVTC recommended several pollution prevention strategies from education to supporting development of renewable energy sources. The GCVTC also identified regional goals of renewable energy usage of 10% by 2005 and 20% by 2015. These are referred to below as the "10/20 goals." The GCVTC also recommended that progress towards this goal should be evaluated every five years, in conjunction with regular reviews of emissions reductions and progress toward the national visibility goal.[18] 40 CFR 51.309(d)(8) includes the regulatory language for the GCVTC's recommendations.

The Air Pollution Prevention (AP2) Forum was created in September, 1998 by WRAP to study the issues related to pollution prevention required in 40 CFR 51.309(d)(8), and to develop work products the states and tribes could rely on when developing SIPs. The AP2 Forum's documents may be found at www.wrapair.org. These include information related to identifying barriers and policies that could lead to increased investment in renewable energy and energy efficiency in the Grand Canyon Visibility Transport Region. The Forum also performed an analysis related to potential emissions reductions, energy cost savings, and secondary environmental and economic benefits of meeting the GCVTC's 10/20 goals.

The Arizona Department of Environmental Quality established a Pollution Prevention Work Group (P2WG) to assist in developing the material necessary for this SIP. The P2WG included representatives from utilities, environmentalists, state energy regulators, and local regulators. The P2WG work products relied upon the work of the WRAP AP2 Forum, and independent research necessary to assemble the materials in this chapter.

Arizona's P2WG reviewed WRAP's policy on renewable energy and energy efficiency. Appendix A-12a entitled "*Arizona Pollution Prevention Work Group Review of WRAP Policy on Renewable Energy and Energy Conservation*" contains a copy of a comment letter sent to WRAP's Air Pollution and Prevention Forum (AP2 Forum) along with a copy of the WRAP Policy entitled, "Renewable Energy and Energy Efficiency As Pollutuion Prevention Strategies For Regional Haze."

12.2. Approach to Addressing Requirements Under 40 CFR 51.309(d)(8)

Pursuant to 40 CFR 51.309(d)(8), the following sections, (1) identify, describe and/or inventory programs being implemented by various companies, organizations and agencies in the State of Arizona, including renewable energy programs, incentive programs, programs to preserve and expand energy conservation efforts, and programs to demonstrate progress towards renewable energy goals; and (2) project emission reductions, visibility improvements and other impacts anticipated to result from such programs. Arizona's approach to address the specific requirements of 40 CFR 51.309(d)(8) are summarized in Table 12-1.

[18] *Recommendations for Improving Western Vistas*, Grand Canyon Visibility Transport Commission; Western Governors' Association: Denver, CO, June 10, 1996, page 30.

Table 12-1. Arizona's Approach to Address 40 CFR 51.309(d) Requirements

Citation in 40 CFR 51.309(d)	Description of Requirement	Addressed in Section
(d)(i)	Description of Existing Pollution Prevention Programs	12.3
(d)(i)	Renewable Energy Generation Capacity and Production	12.4
(d)(i)	Summary of Anticipated Renewable Energy Contribution	12.5
(d)(ii)	Incentive Programs	12.6
(d)(iii)	Programs to Preserve and Expand Energy Conservation	12.7
(d)(iv)	Potential for Renewable Energy	12.8
(d)(v)	Projection of Pollution Prevention Programs on Visibility	12.9
(d)(vi)	Programs Relied on to Achieve GCVTC Renewable Goals	12.10
(d)(vi)	Future Progress Reports	12.11

The inclusion in the SIP of these programs and estimated emission reductions and impacts shall not render such programs and estimates mandatory and/or federally enforceable, nor are such programs or estimates relied on for purposes of meeting the visibility goals established as part of the SIP planning process. These programs are voluntary or state programs that were never intended to be federally enforceable, and the projected emission reductions are estimates only. It is expected that these programs and the associated emissions impacts will change over time and will be reflected in the progress reports for 2008, 2013, and 2018 required under 40 CFR 51.309(d)(10).

12.3. Description of Existing Pollution Prevention Programs in Arizona

Pursuant to 40 CFR 51.309(d)(8)(i), Tables 12-2 and 12-3 summarizes all pollution prevention programs currently in place in Arizona. Table 12-2 summarizes the renewable energy programs currently in place. Table 12-3 summarizes the energy efficiency programs currently in place for Arizona. Table 12-4 summarizes planned renewable energy projects as of 2002.

Table 12-2. Summary of Renewable Energy Programs Currently in Place in Arizona

Program Title	Program Description
Environmental Portfolio Standard	The Arizona Corporation Commission (ACC) approved rules implementing the Environmental Portfolio Standard, in March 2002 (ACC R14-2-1618). The standard requires a minimum percentage of retail electricity sales to be from eligible solar electric or "environmentally friendly renewable electricity technologies." Technologies included are: photovoltaics, solar thermal resources that generate electricity, solar water heaters, solar air conditioning systems, in-state landfill gas generators, wind generators, and biomass generators. The standard began with 0.2% in 2001, rises to 1.1% in 2007, and then remains stable until 2012. 2001 0.2% 2002 0.4% 2003 0.6% 2004 0.8% 2005 1.0% 2006 1.05% 2007-12 1.1% At least 50% of the portfolio standard must be solar electric in early years, increasing to 60% solar electric in 2004. The portfolio includes incentives or "extra credit multipliers" for early installation, for installation in Arizona, for using equipment manufacturers in Arizona, for use in "distributed"

<table>
<tr><th>Program Title</th><th>Program Description</th></tr>
<tr><td></td><td>applications or various programs including green pricing, net metering, solar leasing, or customer-sited systems. This standard only applies to electric suppliers who are regulated by the Arizona Corporation Commission. It does not apply to municipal utilities, irrigation districts, electrical district, and other quasi-governmental utilities. Further information can be found at the Arizona Corporation Commission website, http://www.cc.state.az.us/utility/electric/R14-2-1618.htm
2001/2002Arizona Environmental Portfolio Standard Results (in kWh Credits[1])
<table>
<tr><td></td><td>2001</td><td>2002</td></tr>
<tr><td>Arizona Public Service</td><td></td><td></td></tr>
<tr><td>Solar Electricity (Utility)</td><td>17,237,202</td><td>9,126,664</td></tr>
<tr><td>Solar Hot Water</td><td>6,541,328</td><td>2,208,334</td></tr>
<tr><td>Solar Air Conditioning</td><td>---</td><td>---</td></tr>
<tr><td>Landfill Gas</td><td>11,307,931</td><td>44,938,574</td></tr>
<tr><td>Biomass</td><td>---</td><td>---</td></tr>
<tr><td>Wind</td><td>---</td><td>---</td></tr>
<tr><td>Total</td><td>34,786,461</td><td>56,273,572</td></tr>
<tr><td></td><td>(99.1% of requirement)</td><td>(59.68% of requirement)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Tucson Electric Power</td><td></td><td></td></tr>
<tr><td>Solar Electricity (Utility)</td><td>2,990,538</td><td>9,006,169</td></tr>
<tr><td>Solar Hot Water</td><td>---</td><td>---</td></tr>
<tr><td>Solar Air Conditioning</td><td>---</td><td>---</td></tr>
<tr><td>Landfill Gas</td><td>6,884,068</td><td>16,024,836</td></tr>
<tr><td>Biomass</td><td>---</td><td>---</td></tr>
<tr><td>Wind</td><td>---</td><td>388,070</td></tr>
<tr><td>Total</td><td>9,874,606</td><td>25,419,075</td></tr>
<tr><td></td><td>(71.7% of requirement)</td><td>(79.31% of requirement)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Citizens Communications</td><td></td><td></td></tr>
<tr><td>Solar Electricity</td><td>152,000</td><td>39,000</td></tr>
<tr><td>Total</td><td>152,000</td><td>39,000</td></tr>
<tr><td></td><td>(6% of requirement)</td><td>(1% of requirement)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Navopache Electric</td><td></td><td></td></tr>
<tr><td>Landfill Gas</td><td>150,000</td><td>644,377</td></tr>
<tr><td>Total</td><td>150,000</td><td>644,377</td></tr>
<tr><td></td><td>(50% or requirement)</td><td>(50% or requirement)</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
[1] The portfolio includes incentives or “extra credit multipliers” for early installation, for installation in Arizona, for using equipment manufacturers in Arizona, for use in “distributed” applications or various programs including green pricing, net metering, solar leasing, or customer-sited systems. Therefore the Total number of actual kWh achieved is less than the kWh credits shown in the table above. Further information can be found at http://www.cc.state.az.us/utility/electric/R14-2-1618.htm.

The lead agency in implementing this strategy is the Arizona Corporation Commission.</td></tr>
<tr><td>Regulated Utility Customer Funding or System Benefit Charge Funding for Renewables</td><td>Regulated utilities in Arizona have utility customer funding or system benefit charge (SBC) funding to support low income, demand-side management (DSM), environment, renewables, and other programs beneficial to society. A portion of the funds is targeted to the development of renewable energy, including the support of the Environmental Portfolio Standard. System benefit charges (SBC) are funds approved by the state’s regulatory oversight body, the Arizona Corporation Commission. Further information can be found at: http://www.cc.state.az.us/utility/electric/rules-electric.htm
Arizona Public Service: 2002 -- $7 million in approved spending, of which $6 million was used for renewable energy programs and technology development, and $1 million for low-income customer</td></tr>
</table>

Program Title	Program Description
	support. In addition, under the EPS program, APS collected an additional$6,571,745 for renewable energy programs in 2002. Tucson Electric Power: 2002 --$3 million in approved SBC spending, of which $2 million was for renewable energy programs and $1 Million for low income and energy efficiency programs. In addition, the EPS surcharge collected $2.4 million for renewables.
Salt River Project Customer Funding	Salt River Project (SRP) has a SBC that supports customer assistance programs, renewable energy development and maintenance, and other programs. Since December 31, 1998, the SBC has generated approximately $123 million. In 2002, this generated $3.8 million in funding for renewable resources. In addition, SRP designated additional program funding each year and plans to continue this funding in future years. SRP customers support renewable energy programs through the SRP EarthWise Energy green pricing program. Revenues received from these premiums are used to build new renewable energy projects in the community.
Government Purchase Requirements	ARS 34-452 Arizona law requires that new state building projects over six thousand square feet follow prescribed solar design standards and that solar improvements be evaluated on the basis of life cycle costing. Such new buildings include state office buildings, school districts, community college districts and universities. These projects must include evaluation of (a) proper site orientation, (b) active and passive solar energy systems for space heating, (c) solar water heating, and (d) use of solar day-lighting devices. The life cycle costing requirements state that solar energy and energy conservation design, equipment and materials shall be used if the simple payback in energy savings is eight years or less. http://www.azleg.state.az.us/ars/34/00452.htm
Consumer Education and Information	Million Solar Roofs program – educates consumers on solar products and encourages them to install photovoltaics on homes and businesses. The major utilities in the state operate programs to market the renewable energy they produce. APS – Solar Partners SRP- EarthWise Energy TEP-Greenwatts APS has programs to educate customers about renewable energy and energy efficiency. Examples include: Project SOL (http//:projectsol.aps.com) where customers can learn about solar power and see how they can be used to generate electricity; the APS Solar Test and Research Center (www.aps.com/solar) where customers and students are provided tours of one of the leading solar research center in the world to see and learn about the latest in solar technology; and the APS web site www.aps.com where anyone with access to the web can keep abreast of APS' many renewable and energy efficiency programs including home energy audits and energy savings and conservation information. SRP also has a Customer Support Group that helps with program development and evaluation, and to assist in communicating program messages to the community. The Arizona Solar Energy Industries Association operated the Solar Options in Arizona program through their hotline for consumer education. They also have homeowners' association education program on installation of solar hot water systems. Arizona Solar Center is a website run by a non-profit offering a variety of information for consumers. Tucson Coalition for Solar – conducts an annual home tour and ongoing education on renewable energy.
Net Metering	In 1981, the ACC adopted a net metering rule (Decision No. 52345) requiring the state's regulated utilizes to offer net metering for renewable and cogeneration resources with the capacity of 100 kilowatts or less. Excess electricity generated by the system is purchased at each utility's avoided cost. Further information can be found on the net metering rule at: http://www.eren.doe.gov/greenpower/netmetering/index.shtml#AZ Arizona Public Service (APS) company filed in 1994 to allow net billing of all renewable energy generators under 10kW. Net excess generation under the APS tariff is purchased at the utility's avoided cost.

Program Title	Program Description
	Tucson Electric Power Company (TEP) filed two net metering tariffs in 1996 that were revised in 2003. The first is Tariff 101which applies to all qualifying non-firm customers, and Tariff 102 applies to all qualifying firm customers. Under both tariffs, net metering is allowed for QFs whose maximum monthly usage is 100 kW or less. These tariffs are for customers who have installed either a single solar to electricity or wind to electricity conversion system of AC electrical peak capability of 10 kW or less, and meet all TEP qualifications. Excess net generation is credited to the customer's account each billing month (when applicable), and credits may be applied throughout the calendar year. However, each January any remaining credit to the customer's account will be zeroed out.
Information Disclosure	1996 Arizona Corporation Commission Rule R14-2-1617 ACC adopted disclosure provisions as part of the 1996 Retail Electric Competition Rules. Under the disclosure provision, all retail suppliers of electricity must disclose composition, fuel mix, and emissions characteristics upon request. http://www.cc.state.az.us/utility/electric/rules-electric.htm
Green Pricing	Arizona Public Service Solar Partners APS was the first utility in the state to develop a green energy option for its customers in 1996 with the APS Solar Partner Program. APS customers have the option to support the development of solar power in APS service territory by purchasing 15kWh of 100% solar power for $2.64 though the APS Solar Partner Program. Customers may choose as many 15 kWh blocks of solar power as they wish. The funds raised go towards the development of additional new solar power plants for APS Solar Partners. APS has installed a combination of fixed, tracking and concentrating solar technologies and will continue to install new solar power plants that are the most cost effective for our customers. www.aps.com/solarpartners Salt River Project: SRP provides a solar energy purchase option to its customers. Dubbed EarthWise Energy, SRP customers can purchase 100-watt block of solar power capacity for $3.00 per month. For more details see http://www.eren.doe.gov/greenpower/gp_munipu.html#srp TEP Green Watts: Launched in January 2000, Green Watts is a TEP program that enables supporters to invest directly in the creation of "green" power. For each Green Watt that a customer adopts, TEP will generate 20-kilowatt hours per moth from renewable energy resources. The first Green Watt is $2.00 and each additional Green Watt is $1.50. This amount appears as a line item on a customer's monthly statement. Every ten Green Watts that are adopted save a ton of coal per year from being used and encourages environmental conservation in Southern Arizona. 100% of the dollars raised go directly to building and maintaining renewable facilities in Arizona. http://greenwatts.com/gw_pages/gw_Home.html
Economic Incentive for Renewable Manufacturers	Arizona's Environmental Portfolio Standard provides extra credit for Arizona solar-electric capacity that incorporates Arizona-built components. From the rules (C.2.b): In-State Manufacturing and Installation Content Extra Credit Multiplier: Solar electric power plants shall receive up to a .5 extra credit multiplier related to the manufacturing and installation content that comes from Arizona. The percentage of Arizona content of the total installed plant cost shall be multiplied by .5 to determine the appropriate extra credit multiplier. So, for instance, if a solar installation included 80% Arizona content, the resulting extra credit multiplier would be .4 (which is .8 X .5).
Financial Incentives	Environmental Technology Facility Credit – Allows a personal or corporate income tax credit of 10% of the cost of construction of a qualified environmental technology manufacturing, producing or processing facility. (Source: DSIRE Database http://www.ncsc.ncsu.edu) Solar and Wind Energy System Tax Credit- ARS-43-1083, ACC R14-2-1618, Provides a personal income tax credit of 25% of the cost of a solar or wind energy device. (Source: DSIRE Database http://www.ncsc.ncsu.edu) Solar and Energy Equipment Tax Exemption – Provides a retail sales tax exemption of up to $5000 for solar and wind energy equipment. Legislation http://www-solar.mck.edu/finance/AZ08.htm (Source: DSIRE Database http://www.ncsc.ncsu.edu/dsire.htm) APS offers the APS EPS Credit Purchase program. This program provides a financial incentive to APS customers for the installation of solar electric and solar water heating systems on customer

Program Title	Program Description
	homes. Customers that choose to include Photovoltaic systems on their homes or businesses can receive $2.00 per watt-dc for the installation of systems up to 5 kW. In addition, APS also provides an incentive to customers that replace or supplement electric water heaters with solar water heating. Customers receive $350 for the professional installation of a new solar water heating system. APS pays these customers for opportunity to use the environmental benefits from these systems to meet its own EPS goals. Once the system is professionally installed, the customer submits the application to APS and APS pays the customer directly. http://www.aps.com/my_community/Solar/eps.html TEP SunShare: Launched in 2002, TEP's SunShare program is designed to encourage customers to install new photovoltaic equipment at their residence or business. TEP currently offers two options for those who are interested in investing in solar. SunShare, option #1, requires that customers provide their own photovoltaic equipment while SunShare Kit, option #2, requires that customers purchase the solar equipment from TEP. Under the SunShare programs, systems of 1kW to 5kW are eligible. The customer may either purchase a qualifying system, 1kW thru 5kW, from a third party or may purchase one to five 1-kW system kits from TEP. Under SunShare, option #1, TEP will credit the customer $2,000 per AC kW of proven, installed solar generating capacity. Under the SunShare Kit, option #2, TEP will credit the customer $2,000 for each 1kW system, up to $10,000 for five systems. The kit includes panels, inverter, supports, meter, and meter socket. The retail cost for a 1 kW solar kit is approximately $9,000 plus installation costs. However, a kit purchased from TEP will cost $4000 after the $2000 credit. TEP also offers a net metering option which credits the customer with the energy sent into the grid on a kWh basis. http://greenwatts.com/gw_pages/gw_sunshare.html

Table 12-3 summarizes the energy efficiency programs currently in place for Arizona. There is a long list of energy efficiency programs, including programs offered by the State Energy Office and the utilities. Summaries of the programs are provided. A few programs have listed quantification information in terms of energy savings or program expenditures; many are not quantified because this type of information is currently not available.

Table 12-3. Summary of Energy Efficiency Programs in Place in Arizona

Program Title	Program Description	2002 Status	Ref.
Arizona Energy Office, Arizona Dept of Commerce	The Energy Office's $2.3 million annual budget is funded through a combination of federal funds and Petroleum Violation Escrow funds. Director: Craig Marks (602) 771-1139 craigm@azcomerce.com http://www.azcommerce.com?energy/default.asp	The Energy Office's mission is to encourage energy efficiency and renewable-energy usage, provide energy education and community outreach, offer policy advise to the Executive and Legislative branches, and help Arizona low-income residents to reduce their utility bills and improve their comfort and safety.	3,4
Low Income Weatherization	The Energy Office administers Arizona's $3 annual million (federal and private funds), low-income, weatherization program. The primary mission of this program is to reduce the energy required for space heating and cooling for income eligible households applying for assistance through one of ten sub-grantees, statewide. This program receives its primary funding from the U.S. Department of Energy and the U.S. Department of Health and Human Services. The program also leverages additional funds through partnership with utilities,	17,000 homes weatherized to date. In 2002, 695 homes were weatherized statewide, with present- value utility savings of three million dollars. In addition to approximately $2.2 million in federal funds, the utilities provided the following: 2002 Utility Funding:	3

Program Title	Program Description	2002 Status	Ref.
	and other federal and state housing programs. Many aspects of the Residential Training and Technical Assistance Programs are now incorporated into the training of Weatherization sub-grantees, which assures that savings are maximized. The following are done under the program: • Adding thermal insulation to the residential building envelope, most typically attic insulation. Shading sun-exposed windows, primarily for houses using central refrigeration cooling. • Implementing air leak control measures to reduce excessive infiltration of outside air. • Testing, tuning and maintaining heating and cooling equipment. • Reducing duct leakage where heating and central refrigerated air is distributed by a forced air system. • Installing low-flow showerheads and other general energy and water efficiency measures. • Other energy conservation improvements as identified by the home energy auditor.	SW Gas $350,000 APS $302,397 TEP $180,000 Citizens $68,885 Co-ops $4,500 Total $905,782	
Special Project Grants	The Energy Office administers the State Energy Project – Special Project Grants. Each year states submit proposals in response to a DOE solicitation identifying how specific technologies could be implemented in their region of the country. DOE then selects the projects that best meet national energy goals. The Energy Office publicizes grant availability, helps prepare grant applications, and administers grants. The Energy Office is currently administering $2,865,375 SEP Special Project funds.	<u>2002 Special Project Awards</u> $800,000 to Pinnacle West for Hydrogen Power Park $75,000 to Tucson USD for Tucson Solar Schools $100,000 for Teaching Energy Conservation Supports Implementation of Energy Codes in Tucson Metro Area and Southern Arizona Communities $25,000 for Tucson Regional Clean Cities Coordinator $48,808 to AZ Energy Office to Film New Solar in Arizona Documentary $45,000 to Energy Office for State Industries of the Future Program Federal IOF – 9 Industries Targeted to Improve Energy Efficiency and Productivity, and to Manage Waste Streams AZ IOF Chapter Will Target 4 of the Federal IOFs – Agriculture, Aluminum, Forest Products, and Mining Goal – Establish Industry, Government, University Partnerships, With MOU Executed by 2004.	

Program Title	Program Description	**2002 Status**	**Ref.**
Residential-Market Training and Technical Transfer	Over 30,000 new homes are built each year in metro-Phoenix, making it one of the largest new home markets in the United States. Thousands more homes are built each year in other fast-growing Arizona communities. Improving the energy efficiency of new homes has an enormous impact on Arizona's energy usage. The Energy Office has long partnered with Arizona utilities to provided technical assistance and training for the building trades on the latest energy efficiency technologies and techniques, including: Infrared imaging to analyze insulation performance; Smoke generation to show duct leakage; and Using pressure diagnostics, such as the blower door testing, duct blasters, and digital monometers, to confirm envelope integrity. Overall the goal is to encourage builders and subcontractors to take a scientific systems approach to home construction and incorporate energy-efficient techniques into the building process.	Arizona's largest HVAC contractor now seals all ductwork, which has saved Arizonans over $27 million in energy bills since 1997. Over the past year, in partnership with the home-building industry and Arizona utilities, the Arizona Energy Office provided 23 days of training to over 2,500 attendees from the building-trades industry. Because of the innovations and techniques brought to the market, builders have helped develop and introduce Energy Star-certified homes into the Arizona market. Energy Star is a joint program offered by the U. S. Environmental Protection Agency and the U. S. Department of Energy. Energy Star certification requires a home to be 30% more efficient than the 1995 Model Energy Code, which saves the average homebuyer approximately $400 a year. Of the 34,000 Energy Star homes built nationally in 2001, over 8,000 were built in Arizona. Arizona homebuilders are also national leaders in offering guaranteed heating and cooling costs. These homes are typically 40% to 50% more efficient than required by the 1995 Code, and have guaranteed annual heating and cooling costs of approximately $ .30 per square foot. Regional and national homebuilders now market entire subdivisions where each home comes with guaranteed energy bills.	
Municipal Energy Management Program	The MEMP (Municipal Energy Management Program) encourages and assists in the development and implementation of energy management programs by facilitating the planning process and providing the necessary basic tools, staff training and technical assistance. As part of MEMP, the Energy Office makes funds available for energy saving projects. Those eligible to apply include incorporated Arizona cities, towns, counties, improvement districts, and Indian tribes with populations under 70,000. The MEMP approach to energy conservation is a simple and direct step-by-step approach. The first step is to understand where energy is being consumed and how much it costs, based on the utility bill analysis and audits. The second step identifies strategies for lowering energy costs. The third step assists in incorporating energy management into future development through an energy management plan.	$150,000 awarded to Arizona communities in 2002	

Program Title	Program Description	**2002 Status**	**Ref.**
Federal Energy Management Program	Goal: reduce the cost and environmental impact of the federal government by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at federal sites. Funds are occasionally available to the Arizona Energy Office to partner with Indian communities and military bases or other federally-owned facilities	Ak Chin Community. This outreach was funded by thee Western Area Power Administration and FEMP. The Energy Office performed the following services for the Community: Residential Energy Audits Weatherization Training	
Market Design Initiatives	Salt River Project's M-Power is a residential prepayment program, which uses a special electric meter located outside the home, a small display unit located inside the home and smart cards, which work in a way similar to prepaid telephone calling cards. The SRP M-Power display shows how much energy is used daily and hourly, and when to buy more energy via the smart cards. With actual information on cost of consumption, customers conserve and can save as much as 10% on electric bills. At the same time, SRP reduces turn-off and turn-on costs, while improving customer satisfaction.		
Regulated Utility Customer Funding or System Benefit Charge Funding for Energy Efficiency	Tucson Electric Power: 2002 --$3 million in approved SBC spending, of which $2 million was for renewable energy programs and $1 million for low income and energy efficiency programs. Arizona Public Service: 2002 - $7 million in approved spending, of which $6 million was used for renewable energy programs and technology development, and $1 million for low-income customer support and other programs. In addition, under the EPS program, APS collected an additional $6,571,745 for renewable energy programs in 2002. See also the listing in Table 12-2 under the heading Regulated Utility Customer Funding or System Benefit Charge Funding for Renewable Energy.		
Residential New Construction and New Home Guarantee Programs	To help promote the value of energy efficient residential construction, APS works with builders and building material vendors to provide buyers with a heating and cooling guarantee. All participating builders must offer their homebuyers a 2-year guarantee that the monthly costs to heat and cool their home will be less than a specified amount. APS has promoted the concept of guaranteed heating and cooling bills through a multi-media campaign including TV, print, on-line, and point-of-sale materials. In 1997, TEP designed and implemented the first utility operated new home guarantee program in the nation. The program philosophy addresses the	Currently four of the top ten production builders in the Phoenix metro area are participating in the program and over 3500 home lots have been committed. Since inception to December 2002, there were 5590 homes either completed, in some progress of completion or waiting for	

Program Title	Program Description	2002 Status	Ref.
	issues of affordability, durability, comfort, health and safety using scientific laws of airflow, moisture-flow and pressure management within a home. Homes are constructed to high standards set by TEP and include on-site inspections of framing areas related to energy performance, insulation installation, and HVAC system design and installation. On-site testing is also provided to measure duct leakage, whole-house infiltration and pressure management within the home under various operating conditions. If a home passes all inspection and testing criteria, the homeowner receives a guarantee from TEP that heating and cooling costs will not exceed a predetermined average cost per day (calculated on each separate model home) and a guarantee for comfort for a pre-set time period. Homes permitted prior to February 20, 2003 receive a 3-year guarantee and homes permitted after February 20, 2003 receive a 5-year guarantee. Homeowners who purchase a TEP Guarantee home qualify for a specially designed rate-tariff that reduces the cost of all electricity used in the home by 12% annually compared to the standard residential electric rate. The homeowners also have the option to increase this electric rate savings to either 18% or 22% depending on their selection of TOU and/or the installation of solar water heating systems.	construction to begin. The program is operated within the utility structure with quality control provisions and the guarantee provided by a utility. All TEP Guarantee Homes qualify for ENERGY STAR since the qualifications from TEP are more stringent than ENERGY STAR. TEP provides the DOE/EPA program documents to customers along with the Guarantee certification.	
New Construction Energy Efficiency Research and Training	In partnership with the Arizona Energy Office, APS has conducted extensive research and testing on new residential construction with blower doors, duct blasters, infrared cameras, and other diagnostic tools. The result of these tests is a list of building construction details that need the most focus to improve home performance. In 1998, APS and the Arizona Energy Office began offering Building Science training for residential builders. TEP hosts quarterly education programs to target audiences of builders, sub-contractors, and city/county code officials, architects and consumers. These programs are designed to educate all audiences on the scientific approach of building new homes or retrofitting existing homes to gain the maximum benefit in affordability, durability, comfort and health and safety. TEP also adds matching funds for grants provided to the City of Tucson 'Teaching Energy Conservation' project which educates consumers, builders, contractors, consumers and code officials on various conservation related issues. The SRP-Certified Home (SCH) program was introduced in May 1995. For a subdivision to be	In 1998, APS and the Arizona Energy Office began offering Building Science training for residential builders. To date, over 2000 building industry members have attended. Coupled with the heating/cooling guarantee program, this has resulted in substantial improvements in the real world performance of residential new construction as confirmed through field studies by the Arizona Energy Office. Between 1999 and 2002, approximately	

Program Title	Program Description	**2002 Status**	**Ref.**
	SRP certified, SRP works directly with the builder to ensure that each home design meets our energy-efficiency standards. SRP certification means the home design includes certain energy-efficient features. Certification is based on the SRP-Certified Homes Point Sheet that primarily is a construction specification trade-off system. With the system, one design feature may be substituted for another if the overall design complies with the SRP-Certified Home energy consumption standard. Between 1999 and 2002, approximately 21,000 SCH contracts were signed. In 2002 SRP announced a new addition to the SRP-Certified Home program. Energy Code Compliance certification is now available upon request. SRP can provide REM/Design compliance reports for 1998/2000 International Energy Conservation Codes (IECC), CABO Model Energy Code (MEC), and ASHRAE 90.2 By adding the new "Code Compliance" feature to the program we can now assist builders in meeting the energy efficiency codes required by the various municipalities.	21,000 SCH contracts were signed.	
Qualified Contractor Program	APS offers referrals to customers seeking qualified, professional HVAC contractors for service or replacement of their existing AC/heat pumps. To qualify for the program, residential HVAC contractors are required to meet stringent requirements and complete ongoing rigorous APS education courses for their service technicians.	To date, APS has subsidized technical training for over 6000 service technicians. APS currently provides free contractor referrals to approximately 4000 customers each year, ensuring that units are properly serviced and installed.	
High Efficiency Appliance Programs	APS High Efficiency Air Conditioners Program For several years APS has worked with the air conditioner contractor community. This partnership has been instrumental in moving the market for resale air conditioners and heat pumps to high efficiency equipment. Evidence suggests that the resale market is about 90% 12 SEER, which is 15% more efficient than standard equipment, reducing demand and energy consumption. SRP Rebates on Highly-Efficient Refrigerators and Heat Pumps – Over the last several years, SRP has independently offered customers rebates on highly efficient refrigerators and heat pumps.	Since 1998, APS and contractors have distributed over 20,000 copies of the Consumer's Guide to an Energy Efficient Air Conditioning System as an education tool for customers. SRP has issued more than 8,500 rebates on refrigerators labeled by ENERGY STAR® as exceeding federal standards and more than 1,000 rebates on heat-pumps with a 13-SEER rating that also meet additional strict criteria.	
Time of use rates	APS Time of use rates - Approximately 40% of all residential customers are on a time of use rate. It is one of the highest penetrations of TOU rates in the country. APS is one of the only utilities nationwide to offer a demand rate for residential customers. Most new APS customers apply for one of the two		

Program Title	Program Description	**2002 Status**	**Ref.**
	TOU rates. Evidence suggests it reduces demand and shifts load. A recent survey of customers indicates that over 75% of TOU customers do shift some of their energy use to off-peak time periods. Customers feel it gives them control over their electric bill and helps conserve peak energy. SRP has approximately 140,000 customers on our peak-load shifting program, Time-of-Use (TOU). Residential TOU customers average 75% off-peak usage annually, while non-TOU residential customers average 72% - 73% off-peak usage annually. The result of TOU is that SRP has been successful in shifting 2%-3% of our average annual energy consumption to off-peak.		
Peak Reduction Campaign	Commercial Peak Reduction Campaign -- Since the summer of 2001, APS has promoted a voluntary summer peak energy management initiative with commercial customers. Participating customers pledge to save energy on extreme summer days when temperatures exceed 110 degrees in Phoenix. Customers receive an email on "Peak Power Days" asking them to turn thermostats up two degrees, turn off unnecessary lights and equipment, and adjust the schedule of energy-intensive processes. The campaign has helped shave peak consumption and heightened awareness of the need to save energy on extreme summer days.		
Shade Trees Campaign	The TEP Trees Program promotes energy conservation and the environmental benefits associated with planting low-water usage trees and other vegetation. Desert-adapted trees have been provided to residential neighborhoods, low-income families, public areas and schools by TEP. The residential trees are to be located on the south, west and east sides of homes in the TEP service area with the objective of continuing positive community service as well as providing Demand-Side Management ("DSM") benefits. Residential Program: There were 3,000 trees distributed to roughly 1,500 homes for the period January 1, 2002 through December 31, 2002. School and Community Programs: For the period January 1, 2002 through December 31, 2002, this program provided 105 fifteen-gallon-sized and 41 five-gallon-sized trees to 43 schools. In addition, 63 community projects received 115 fifteen-gallon-sized and 111 five-gallon-sized trees.		

Program Title	Program Description	**2002 Status**	**Ref.**
Energy Efficiency Education	APS provides a free on line energy analysis on aps.com. It allows customers and prospective customers to analyze their home and business energy use and identify customized energy efficient measures. APS provides seasonal energy savings tips online and in customer bill inserts. SRP Energy Savings Solutions Campaign Energy Savings Solutions (ESS) is a multi-media campaign, which runs from May through September. The goal of ESS is to educate customers about effective energy management. ESS provides customers with useful and easy ways to lower their energy usage and enables customers to make informed decisions everyday by demonstrating how home energy conservation efforts can help reduce energy costs. TEP provides free class sets of booklets to schools in its area, including, "Learning to Save Energy", which is geared to grades 3-5. TEP also offers teacher training and back up materials for two hands-on activities: The Insulation Station (which deals with residential energy issues) and The Energy Patrol (where a class or group of students learn about energy efficiency, and then try to "patrol" their school, helping remind others how to save energy). TEP also provides seasonal energy tips on-line and in mailings to customers and handouts at presentations.		
Energy Star	Customer Education on Purchasing Decisions SRP has been an ENERGY STAR® partner since 1999. This DOE/EPA program establishes stricter efficiency criteria for new products. As a partner, SRP has been able to not only increase awareness of ENERGY STAR, but also to provide information for customers so that they can make informed purchase decisions. This information has been incorporated into our monthly newsletters and our Energy Savings Solutions campaign and has also been heavily featured in on-going publications to both residential and commercial customers via *Powerful Solutions* and *eNews*.		
Energy Efficiency Audits	For approximately the last two years, SRP has been working with third party contractors and other entities such as the Arizona Department of Commerce to provide free or low cost energy efficiency audits and educational programs to energy consumers in the commercial, industrial and government sectors. The focus of the programs to date has been on high-efficiency lighting retrofits, energy information services, and improvements to compressed air systems.		

Program Title	Program Description	2002 Status	Ref.
	TEP offers the Energy Advisor, a quick, free, online analysis of a home's or business's monthly energy use, as well as suggestions on how to reduce energy costs.		
State Energy Efficiency Demonstration Program	Working with the Department of Administration and agency facility managers, the Energy Office provides training, technical assistance and funding to implement energy savings and demand-reduction measures in state-controlled facilities. Matching grant program.	Ongoing.	
State Facility Managers Training Program	Based on results of the forensic audits and utility tracking, the Energy Office provides training and technical assistance to state facility management staff with the goal of identifying actions that may be taken to decrease electricity consumption in state facilities. This training will assist facility managers in performing diagnostics on their facilities, complete retrofits on equipment and buildings, and track energy consumption.	Ongoing.	
Energy Efficient Schools	Energy Office partnership with School Facilities Board. A jointly funded engineer works with architects and vendors to incorporate cost-effective, energy-efficient designs and equipment. Energy audits of existing facilities are also available.	Significant opportunities have been found in replacement of HVAC package units, lighting retrofits, and central heating and cooling systems, for a total avoided energy costs of $8,916,197 per year.	
State Energy Code	HB 2541 (2001) Is a voluntary model energy code (AZ=home rule). This bill designates the State Energy Code as a legislative tool to create incentives for the use of energy saving devices and practices. It established a State Energy Code Advisory Commission to review and recommend changes to the State Energy Code. http://www.azleg.state.az.us/legtext/44leg/2r/bills/hb2451p/pdf	Energy Code Advisory Commission. Code Advisory Commission members were appointed. First meetings held by the Energy Office to provide technical support to Arizona municipalities In 2001, the Energy Office applied for and received a $100,000 grant from the U. S. Department of Energy to build on the legislative initiative and to initiate an outreach and training program for municipalities, governmental entities, code officials, and the building industry on codes and the impact on Arizona's energy consumption. In 2002, Energy Office efforts on codes are being concentrated in the areas of 1) codes adoption, and 2) training provided to the building industry designed to help insure that structures designed to code will also perform as designed.	1
Governor's Awards for Energy Efficiency	The Energy Office recognizes local governments, state agencies, and educational institutions for exceptional energy-conservation accomplishments.	The 2002 Governor's Awards for Energy Efficiency were presented to Arizona cities, educational institutions and state government agencies in recognition of successful energy conservation programs. Awards of Excellence, the highest honor, went to the City of Bullhead City, Arizona School Facilities Board, Mesa Unified School District and the Tucson Unified School District.	

Program Title	Program Description	2002 Status	Ref.
		The City of Tucson received Awards of Merit for two energy-saving projects. Awards of Merit were also given to the City of Coolidge, Arizona Department of Administration, Arizona Department of Public Safety and the Arizona Department of Game and Fish. The Arizona Department of Emergency and Military Affairs received Awards of Merit for two energy-conservation projects. In addition, Awards of Special Recognition were bestowed on the City of Tucson, Arizona Department of Administration, Arizona Department of Emergency and Military Affairs, Isaac Elementary School District and the Scottsdale Unified School District. The City of Mesa and the City of Phoenix both received Awards of Special Recognition for two energy-saving projects. http://www.azcommerce.com/Energy/eaward.htm	
Rebuild America	U.S. D.O.E. Program supported by Arizona Energy Office. - Helps businesses and communities reduce energy use in buildings.	Ongoing. Energy-efficiency seminar presented to Arizona school officials in September 2002.	1
Green Buildings	Green buildings are use design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment The concept includes: - Sustainable site planning - Safeguarding water and water efficiency - Energy efficiency and renewable energy - Conservation of materials and resources - Indoor environmental quality	City of Scottsdale Green Building Program. This is weighted rating checklist that emphasizes a system's approach by requiring 26 prerequisites. Established in 1998, 47 builders, 129 homes constructed by 2002. http://www.ci.scottsdale.az.us/greenbuilding/ Southern Arizona Green Building Alliance (in progress) This green building program is in its infancy and details are still being determined Contact Loretta Ishida, The Development Center of Appropriate Technology (520) 624-6628 Loretta@dcat.net, http://www.dcat.net	2
Leadership in Energy & Environmental Design (LEED)	This program facilitates positive results for the environment, occupant health and financial return. It defines "green" by providing a standard for measurement, prevents false or exaggerated claims, and promotes whole-building, and integrated design process. LEEDS evaluated and recognizes performance in accepted green design categories, existing and proven technologies. There are four levels of certification.	April Green Building Forum – sponsored by Phoenix, Scottsdale and Surprise. New capital mall buildings including Arizona Department of Environmental Quality and Department of Administration buildings built in 2002.	1
Utility Tracking	Developed by the Energy Office for entities with multiple accounts (e.g., schools, municipalities, large businesses). Uses Microsoft Excel to track utility usage by meter. Captures data from utility's web site. The program identifies problems, and raises questions.	Ongoing.	1

Program Title	Program Description	**2002 Status**	**Ref.**
National Industries of the Future	Administered by Department of Energy – Office of Industrial Technologies 9 Industries targeted that together supply 90% of the materials vital to US economy. The 9 industries are: agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel. Goal: Promote energy efficiency and manage waste streams.	Arizona Industries of the Future being developed by Energy Office with D.O.E grant. 4 industries targeted - Agriculture - Aluminum - Forest Products - Mining	1
Industrial Assessment Centers	Administered by DOE, OIT Enables eligible small and medium-sized manufacturers to have comprehensive industrial assessments performed at no cost to the manufacturers. Teams of engineering faculty and students from the center, located at 26 universities around the country, conduct energy audits, or industrial assessment and provide recommendations to manufacturers to help them identify opportunities to improve productivity, reduce waste, and save energy.	Recommendations from industrial assessments have averaged about $55,000 in potential annual savings for each manufacturer ASU operates one of the 28 National Centers Director: Dr. Patrick E. Phelan (480) 965-1625 phelan@asu.edu	1
Income Subtraction for Construction of an Energy Efficient Residence	For taxable years beginning from and after December 31, 2001, through December 31, 2010, Arizona law (A.R.S. 43-1031) allows a subtraction for a residence that is 50% more efficient than the 1995 Model Energy Code (MEC). The subtraction is allowed for selling one or more new energy efficient residences located in Arizona. The subtraction is equal to 5% of the sales price excluding commissions, taxes, interest, points, and other brokerage, finance and escrow charges. The subtraction cannot exceed $5,000 for each new qualifying residence. A home's energy efficiency must be demonstrated by a score of at least 90 points (indicating that the home is 50% better than the MEC threshold) on a home energy rating. A Certified Home Energy Rater must provide the home energy rating.	Ongoing	4
Building America	Building America is a private/public partnership that provides energy solutions for production housing. The Energy Office assists in disseminating the results of this effort to the Arizona market place.	Ongoing	4
Governor's Smart Energy Usage Program	"Conservation saves money, which makes sense during tight budget times. And decreased energy production saves water, which makes sense during a drought. These two reasons provide more-than-enough motivation to conserve this summer," Arizona Governor Jane Dee Hull said when announcing the Smart Energy: Phase II program for summer 2002. As a result of the success of the 2001 campaign, Governor Hull ordered all agencies under her	The Smart Energy campaigns of 2001 and 2002 require state agencies to set thermostats up two degrees to save energy. As a result it is estimated that these conservation efforts reduced energy usage from 7 to 10 percent and saved the state $115,000 in utility bills during the summer of 2001 The campaign also called upon Arizonans to do their part. "Two Degrees - No Sweat" encouraged Arizonans to save energy by raising thermostats two degrees.	4

Program Title	Program Description	2002 Status	Ref.
	jurisdiction to take a number of energy-saving steps for the second summer in a row. The Governor also asked that state residents voluntarily comply with the "Arizona Smart Energy: Phase II" program. As part of the Smart Energy: Phase II program, the Governor asked all state employees to implement the following energy saving measures: • Every agency will use power management tools like Energy Star to keep computers, monitors and other devices in stand-by mode when not in use. • Employees will turn off lights and office equipment, as much as possible, when they expect to be out of the office for more than one hour. • Agencies will reduce all lighting that does not affect productivity, health or safety. • Thermostats in all state-controlled facilities, will be increased during the months of June through September by two degrees or brought within the 76-79 degrees F range, whichever is greater. • Agencies will implement a professional, casual-dress policy from June through September, consistent with the type of work being performed.		

1 Presentation by Craig Marks, of the Arizona Energy Office, Department of Commerce, to the Pollution Prevention Workgroup, July 26, 2002.
2 "Summary of Green Building Programs," Prepared for National Renewable Energy Laboratory, by National Association of Home Builders Research Center, Second Edition, August 2002.
3 U.S Department of Energy, Office of Building, Technology, State & Community Projects, http://www.eere.energy.gov/buildings/state_energy/
4 Arizona Department of Commerce, Energy Office, http://www.azcommerce.com/Energy/default.asp

The regional haze rule and the 10/20 goals look ahead to future years. While not specifically required, Arizona is providing the following Table 12-4 on renewable energy capacity that is planned as of 2002 to provide information on projects that are in the planning stages and have the potential to provide additional renewable energy capacity in the future.

Table 12-4. Planned Renewable Energy Capacity as of 2002

Program Title	Program Description	Ref.
Land fill Gas Pipeline Project	This is a partnership with Salt River Project, Detroit Edison and Salt River Pima Maricopa Indian Community. The pipeline is between Salt River and Tri-Cities Landfills. It extends the fuel supply to the Tri-Cities Landfill Gas Generation Plant. Facility is expected to be commissioned in the second quarter of 2004	1
Arizona Falls Project	This SRP sponsored project will generate 750 kW. It has roof mounted solar placed on the turbine building. Facility is to be commissioned in second quarter of 2003.	1

Program Title	Program Description	Ref.
Mesa City Library Photovoltaic Parking	This is a 25kW system with covered parking for 34 spaces. Provides green energy for SRP Earthwise Energy customers. Project is expected to be completed May 2003.	1
SRP Park & Ride Photovoltaic	This SRP sponsored project is for a 100kW PV system on parking structures. The PV system is expected to be complete in July 2003. It also has a goal to increase public awareness of renewable energy.	1
APS Prescott Airport Solar Power Plant	APS Prescott Airport Solar Power Plant - Prescott – 5 MW projected in 3 yrs (possibly expandable to 10 MW), This is currently the largest single axis tracking system in the state and is expected to become the largest PV site in the country consisting of both single axis tracking and concentrating PV technologies.	2
APS Solar Trough	APS is building a 1MW demonstration solar thermal trough project that will be tested for performance compared to photovoltaic technologies.	2
APS Dish Stirling tests	10 Units ordered for test once the technology demonstrates performance and price characteristics that exceed photovoltaics.	2
APS Landfill Gas to Energy	There a two 3 MW and one 70 kW landfill gas opportunities being explored by APS. Additionally, new technologies including for generating electricity from methane are being explored including reciprocating engines and micro turbines.	2
APS Wind	APS is exploring wind opportunities as they become available and demonstrate financial viability.	2
APS Biogas	Biogas - Possible opportunities being explored by APS include Water Treatment Plant (6 MW) and Bovine Power (2 MW) using an anaerobic digestion process to convert animal waste into biogas which can the be used to generate electricity.	2
APS Geothermal	APS is beginning evaluation of technology for potential future installation in SE AZ (10 MW).	2
APS Biomass	APS is Exploring the development of Plasma gasification, waste wood (3 MW) biomass opportunities to extract energy from the waste wood resulting from forest management processes due to the State's extended draught and the bark beetle infestation.	2
Springerville Solar Generating Station	As of December 2002, TEP has 2.4 MW solar capacity installed at the Springerville Generating Station in Eastern Arizona. By the end of 2003, the Springerville facility will have 3.5MW of capacity and TEP will have 4MW of capacity overall.	3

1 "Overview of SRP's Renewable Energy Program," Presentation by Herjinder Hawkins to PPWG on March 24, 2003.
2 "Renewable Energy Opportunities in Arizona," Presentation by Cassius McChesney to PPWG on June 2002.
3 "Statewide Economic Study 2002 – Arizona's Energy Infrastructure," Prepared for the Arizona's Department of Commerce by Rebecca Holmes, SRP, and Craig Marks, ACC, September 2002, p. 13.

12.4. Inventory of All Renewable Energy Generation Capacity and Production in Arizona

Pursuant to 40CFR 51.309 (d)(8)(i), Table 12-5 summarizes all renewable energy generation capacity and production in use or planned as of 2002 (expressed in MW and MWh). Appendix A-12b entitled *Details of Renewable Energy Generation and Capacity* contains a detailed inventory of existing and currently planned renewable energy production projects and their references.

Table 12-5. Summary of Renewable Energy Generation Capacity and Production

Categories	Existing Capacity in 2002 **(MW)**	Existing & Planned Capacity as of 2002 **(MW)**	Total Production **in 2002 (MWh)**
Solar	6.222	6.733	10,579.764
Methane	9.500	9.570	63,715.000
Wind	0	0	0
Wood Chips	0	3.000	0
Low-Impact Hydro	0	0.750	0
TOTAL	**15.722**	**20.053**	**74,294.764**

The total electric-energy production in the State of Arizona for 2000 was 89,101,000 megawatt-hours. (Energy Information Administration). The approximate percentage of renewable electric energy generated in 2002 was 0.08%. Generation capacity as of 2002 is summarized in Table 12-6.

Table 12-6. Summary of Arizona's Total Energy Generation Capacity and Production[19]

Rank	**Operator**	**Plant Name**	**Fuel**	**MW**	**Percent**
1	Arizona Public Service Company	Palo Verde	Uranium	3,730	19.2%
2	Salt River Project	Navajo (SRP)[20]	Coal	2,255	11.6%
3	U.S. Bureau of Reclamation	Glen Canyon	Water	1,300	6.7%
4	Pinnacle West	Redhawk Units 1 and 2	Gas	1,060	5.4%
5	U.S. Bureau of Reclamation	Hoover AZ	Water	1,042	5.4%
6	Arizona Public Service Company	Cholla	Coal	995	5.1%
7	Tucson Electric Power Co	Springerville	Coal	800	4.1%
8	Salt River Project	Coronado	Coal	760	3.9%
9	Duke Energy North America	Griffith Energy Project	Gas	620	3.2%
10	Salt River Project	Agua Fria	Gas	619	3.2%
11	Duke Energy North America	Arlington Valley	Gas	570	2.9%
12	Arizona Electric Power Cooperative	Apache	Coal/Gas	560	2.9%
13	Reliant Energy Power Gene	Desert Basin	Gas	560	2.9%
Total, Top 13 Plants				14,871	76%
Balance of State				4,581	
Arizona Total				**19,412**	**MW**

Sources:

Statewide Economic Study 2002, Arizona Energy Infrastructure, Prepared for the Arizona Department of Commerce, September 2002, pg. 7.

Second Biennial Transmission Assessment, 2002-2011, Arizona Corporation Commission, P Plus Corporation, December 2002, pg. 107-124

12.5. Summary of Anticipated Renewable Energy Contribution

The approximate percentage of renewable electric energy generated in Arizona for 2002 was 0.08%. Generation capacity as of 2002 is summarized in Table 12-6 above. Pursuant to 40CFR 51.309 (d)(8)(i), Appendix A-12b entitled of this SIP summarizes the State of Arizona's anticipated contribution toward meeting the GCVTC renewable energy goals for 2005 and 2015. Also see Section 12.10, below.

[19] Based on summertime generating capacity.

[20] This facility is on tribal lands (Navajo Nation).

12.6. Incentive Programs

Pursuant to 40CFR 51.309 (d)(8)(ii), Table 12-7 below identifies incentive programs in the State of Arizona that reward efforts to go beyond compliance and/or achieve early compliance with air pollution related requirements.

Table 12-7. Summary of Arizona's Incentive Programs

Program Title	Program Description
Market Trading	Arizona has opted into the Section 309 regional SO_2 "cap-and-trade program", as outlined in the Annex, under the Regional Haze Rule.
Western Backstop SO_2 Trading Program Early Reduction Credits	As further described in Section C1.1 of the stationary source provisions of this plan, industrial sources of SO_2 subject to the trading program which, upon verification by the State, reduce emissions to levels below their floor amount prior to the program trigger date shall receive additional emission allowances. Such allowances may be used by the source for compliance purposes or may be sold to other parties, hence, providing an incentive for sources to go beyond compliance (i.e., their floor) or to achieve early compliance (i.e., reductions prior to the program trigger date).
Western Backstop SO_2 Trading Program Renewable Energy Credits	As further described in Section C1.1 of the stationary source provisions of this plan, allowances shall be provided to the owners of renewable energy facilities installed since October 1, 2000. Such allowances will hold a market value and therefore provide an incentive for power suppliers to invest in renewable energy facilities with zero or very low air pollutant emissions.

12.7. Programs to Preserve and Expand Energy Conservation Efforts

Pursuant to 40 CFR 51.309 (d)(8)(iii), Table 12-8 identifies programs in Arizona that preserve and expand energy conservation efforts.

Table 12-8. Programs that Preserve and Expand Energy Conservation in Arizona

Program Title	Program Description
Energy Conservation in State Buildings	Legislation passed in 2003 requires that state agencies (the Department of Administration and Transportation and the Board of Regents) reduce energy use by 10 percent by July 1, 2008 and 15 percent by July 1, 2011. Preserve and Expansion Description: This program will expand energy efficiency activities of state agencies. Industry projections for savings from implementation of this measure are projected to be $11 million per year by 2011, with $90 million of cumulative energy efficiency savings over the period 2004-2015.
Purchase of Energy Star Projects by State Agencies	Legislation passed in 2003 requires all state agencies to purchase products certified as Energy Star or certified under FEMP in all categories unless the products is shown not to be cost effective on a life cycle cost basis. Preserve and Expansion Description: State agencies already purchase some products that are Energy Star certified. This program will expand existing energy efficient equipment purchase and have a long-term effect on energy use by state agencies. School districts and all political subdivisions can also purchase these energy star products off of the state contacts, which could further increase the impact of this program.

Program Title	Program Description
Regulated Utility Customer Funding or System Benefit Charge Funding for Energy Efficiency	Tucson Electric Power: 2002 --$3 million in approved SBC spending, of which $2 million was for renewable energy programs and $1 million for low income and energy efficiency programs. Arizona Public Service: 2002 - $7 million in approved spending, of which $6 million was used for renewable energy programs and technology development, and $1 million for low-income customer support and other programs. In addition, under the EPS program, APS collected an additional $6,571,745 for renewable energy programs in 2002. See also the listing in Table 12-2 under the heading Regulated Utility Customer Funding or System Benefit Charge Funding for Renewable Energy.
Residential New Construction and New Home Guarantee Programs	To help promote the value of energy efficient residential construction, APS works with builders and building material vendors to provide buyers with a heating and cooling guarantee. All participating builders must offer their homebuyers a 2-year guarantee that the monthly costs to heat and cool their home will be less than a specified amount. Currently four of the top ten production builders in the Phoenix metro area are participating in the program and over 3500 home lots have been committed. APS has promoted the concept of guaranteed heating and cooling bills through a multi-media campaign including TV, print, on-line, and point-of-sale materials. In 1997 TEP designed and implemented the first utility operated new home guarantee program in the nation. The program philosophy addresses all of the issues of affordability, durability, comfort, health and safety using scientific laws of airflow, moisture-flow and pressure management within a home. Homes are constructed to high standards set by TEP and include on-site inspections of framing areas related to energy performance, insulation installation, and HVAC system design and installation. On-site testing is also provided to measure duct leakage, whole-house infiltration and pressure management within the home under various operating conditions. If a home passes all inspection and testing criteria, the homeowner receives a Guarantee from TEP that heating and cooling costs will not exceed a predetermined average cost per day (calculated on each separate model home) and a guarantee for comfort for a pre-set time period. Homes permitted prior to February 20, 2003 receive a 3-year guarantee and homes permitted after February 20, 2003 receive a 5-year guarantee. Homeowners who purchase a TEP Guarantee home qualify for a specially designed rate-tariff that reduces the cost of all electricity used in the home by 12% annually compared to the standard residential electric rate. The homeowners also have the option to increase this electric rate savings to either 18% or 22% depending on their selection of TOU and/or the installation of solar water heating systems. There are currently over 5500 homes either completed, in some progress of completion or waiting for construction to begin. The program is operated within the utility structure with quality control provisions and the guarantee provided by a utility. All TEP Guarantee Homes qualify for ENERGY STAR since the qualifications from TEP are more stringent than ENERGY STAR. TEP provides this DOE/EPA program documents to customers along with the Guarantee certification. The SRP-Certified Home (SCH) program was introduced in May 1995. For a subdivision to be SRP certified, SRP works directly with the builder to ensure that each home design meets our energy-efficiency standards. SRP certification means the home design includes certain energy-efficient features. Certification is based on the SRP-Certified Homes Point Sheet that primarily is a construction specification trade-off system. With the system, one design feature may be substituted for another if the overall design complies with the SRP-Certified Home energy consumption standard. Between 1999 and 2002, approximately 21,000 SCH contracts were signed. In 2002 SRP announced a new addition to the SRP-Certified Home program. Energy Code Compliance certification is now available upon request. SRP can provide REM/Design compliance reports for 1998/2000 International Energy Conservation Codes (IECC), CABO Model Energy Code (MEC), and ASHRAE 90.2 By adding the new "Code Compliance" feature to the program we can now assist builders in meeting the energy efficiency codes required by the various municipalities.
New Construction Energy Efficiency	In partnership with the Arizona Energy Office, APS has conducted extensive research and testing on new residential construction with blower doors, duct blasters, infrared cameras, and other diagnostic tools. The result of these tests is a list of building construction details that need the most focus to improve home performance. In 1998, APS and the Arizona Energy Office began offering Building

Program Title	Program Description
Research and Training	Science training for residential builders. To date, over 2000 building industry members have attended. Coupled with the heating/cooling guarantee program, this has resulted in substantial improvements in the real world performance of residential new construction as confirmed through field studies by the Arizona Energy Office. TEP hosts quarterly education programs to target audiences of builders, sub-contractors, and city/county code officials, architects and consumers. These programs are designed to educate all audiences on the scientific approach of building new homes or retrofitting existing homes to gain the maximum benefit in affordability, durability, comfort and health and safety. TEP also adds matching funds for grants provided to the City of Tucson 'Teaching Energy Conservation' project which educates consumers, builders, contractors, consumers and code officials on various conservation related issues.
Qualified Contractor Program	APS offers referrals to customers seeking qualified, professional HVAC contractors for service or replacement of their existing AC/heat pumps. To qualify for the program, residential HVAC contractors are required to meet stringent requirements and complete ongoing rigorous APS education courses for their service technicians. To date, APS has subsidized technical training for over 6000 service technicians. APS currently provides free contractor referrals to approximately 4000 customers each year, ensuring that units are properly serviced and installed.
High Efficiency Appliance Programs	APS High Efficiency Air Conditioners Program For several years APS has worked with the air conditioner contractor community. This partnership has been instrumental in moving the market for resale air conditioners and heat pumps to high efficiency equipment. Evidence suggests that the resale market is about 90% 12 SEER, which is 15% more efficient than standard equipment, reducing demand and energy consumption. Since 1998, APS and contractors have distributed over 20,000 copies of the Consumer's Guide to an Energy Efficient Air Conditioning System as an education tool for customers. SRP Rebates on Highly-Efficient Refrigerators and Heat Pumps – Over the last several years, SRP has independently offered customers rebates on highly efficient refrigerators and heat pumps. SRP has issued more than 8,500 rebates on refrigerators labeled by ENERGY STAR® as exceeding federal standards and more than 1,000 rebates on heat-pumps with a 13-SEER rating that also meet additional strict criteria.
Time of use rates	APS Time of use rates - Approximately 40% of all residential customers are on a time of use rate. It is one of the highest penetrations of TOU rates in the country. APS is one of the only utilities nationwide to offer a demand rate for residential customers. Most new APS customers apply for one of the two TOU rates. Evidence suggests it reduces demand and shifts load. A recent survey of customers indicates that over 75% of TOU customers do shift some of their energy use to off-peak time periods. Customers feel it gives them control over their electric bill and helps conserve peak energy. SRP has approximately 140,000 customers on our peak-load shifting program, Time-of-Use (TOU). Residential TOU customers average 75% off-peak usage annually, while non-TOU residential customers average 72% - 73% off-peak usage annually. The result of TOU is that SRP has been successful in shifting 2%-3% of our average annual energy consumption to off-peak. TEP has approximately 7,700 customers on our peak-load shifting program, Time-of-Use (TOU). Residential TOU customers average 80% off-peak usage annually, while non-TOU residential customers average 77% - 78% off-peak usage annually. The result of TOU is that TEP has been successful in shifting 2%-3% of our average annual energy consumption to off-peak.
Peak Reduction Campaign	Commercial Peak Reduction Campaign -- Since the summer of 2001, APS has promoted a voluntary summer peak energy management initiative with commercial customers. Participating customers pledge to save energy on extreme summer days when temperatures exceed 110 degrees in Phoenix. Customers receive an email on "Peak Power Days" asking them to turn thermostats up two degrees, turn off unnecessary lights and equipment, and adjust the schedule of energy-intensive processes. The campaign has helped shave peak consumption and heightened awareness of the need to save energy on extreme summer days.

Program Title	Program Description
Shade Trees Campaign	The TEP Trees Program promotes energy conservation and the environmental benefits associated with planting low-water usage trees and other vegetation. Desert-adapted trees have been provided to residential neighborhoods, low-income families, public areas and schools by TEP. The residential trees are to be located on the south, west and east sides of homes in the TEP service area with the objective of continuing positive community service as well as providing Demand-Side Management ("DSM") benefits. Residential Program: There were 3,000 trees distributed to roughly 1,500 homes for the period January 1, 2002 through December 31, 2002. School and Community Programs: For the period January 1, 2002 through December 31, 2002, this program provided 105 fifteen-gallon-sized and 41 five-gallon-sized trees to 43 schools. In addition, 63 community projects received 115 fifteen-gallon-sized and 111 five-gallon-sized trees.
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Pre-Pay Program	SRP has approximately 31,000 customers on our pre-pay program, M-Power. M-Power customers have reduced their energy consumption by 10% on average. This energy conservation is due to the intensive educational information provided by the program and the discipline required from the customer. M-Power is the largest program of its kind in North America.
Arizona Energy Office, Arizona Dept of Commerce	The Energy Office's $2.3 million annual budget is funded through a combination of federal funds and Petroleum Violation Escrow funds. Director: Craig Marks (602) 771-1139 craigm@azcomerce.com

Program Title	Program Description
	http://www.azcommerce.com?energy/default.asp
Low Income Weatherization	The Energy Office administers Arizona's $3 annual million (federal and private funds), low-income, weatherization program The primary mission of this program is to reduce the energy required for space heating and cooling for income eligible households applying for assistance through one of ten sub-grantees, statewide. This program receives its primary funding from the U.S. Department of Energy and the U.S. Department of Health and Human Services. The program also leverages additional funds through partnership with utilities, and other federal and state housing programs. Many aspects of the Residential Training and Technical Assistance Programs are now incorporated into the training of weatherization sub-grantees, which assures that savings are maximized.
Special Project Grants	The Energy Office administers the State Energy Project – Special Project Grants. Each year states submit proposals in response to a DOE solicitation identifying how specific technologies could be implemented in their region of the country. DOE then selects the projects that best meet national energy goals. The Energy Office publicizes grant availability, helps prepare grant applications, and administers grants. The Energy Office is currently administering $2,865,375 SEP Special Project funds.
Residential-Market Training and Technical Transfer	Over 30,000 new homes are built each year in the harsh desert environment of metro-Phoenix, making it one of the largest new home markets in the United States. Thousands more homes are built each year in other fast-growing Arizona communities. Improving the energy efficiency of new homes has an enormous impact on Arizona's energy usage. The Energy Office has long partnered with Arizona utilities to provided technical assistance and training for the building trades on the latest energy efficiency technologies and techniques, including: Infrared imaging to analyze insulation performance; Smoke generation to show duct leakage; and Using pressure diagnostics, such as the blower door testing, duct blasters, and digital monometers, to confirm envelope integrity. Overall the goal is to encourage builders and subcontractors to take a scientific systems approach to home construction and incorporate energy-efficient techniques into the building process.
Municipal Energy Management Program	The MEMP (Municipal Energy Management Program) encourages and assists in the development and implementation of energy management programs by facilitating the planning process and providing the necessary basic tools, staff training and technical assistance. As part of MEMP, the Energy Office makes funds available for energy saving projects. Those eligible to apply include incorporated Arizona cities, towns, counties, improvement districts, and Indian tribes with populations under 70,000. The MEMP approach to energy conservation is a simple and direct step-by-step approach. The first step is to understand where energy is being consumed and how much it costs, based on the utility bill analysis and audits. The second step identifies strategies for lowering energy costs. The third step assists in incorporating energy management into future development through an energy management plan.
Federal Energy Management Program	Goal: reduce the cost and environmental impact of the federal government by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at federal sites. Funds are occasionally available to the Arizona Energy Office to partner with Indian communities and military bases or other federally-owned facilities
State Energy Efficiency Demonstration Program	Working with the Department of Administration and agency facility managers, the Energy Office provides training, technical assistance and funding to implement energy savings and demand-reduction measures in state-controlled facilities. Matching grant program.
State Facility Managers Training Program	Based on results of the forensic audits and utility tracking, the Energy Office provides training and technical assistance to state facility management staff with the goal of identifying actions that may be taken to decrease electricity consumption in state facilities. This training will assist facility managers in performing diagnostics on their facilities, complete retrofits on equipment and buildings, and track

Program Title	Program Description
	energy consumption.
Energy Efficient Schools	Energy Office partnership with School Facilities Board. A jointly funded engineer works with architects and vendors to incorporate cost-effective, energy-efficient designs and equipment. Energy audits of existing facilities are also available.
State Energy Code	HB 2541 (2001) Is a voluntary model energy code (AZ=home rule). This bill designates the State Energy Code as a legislative tool to create incentives for the use of energy saving devices and practices. It established a State Energy Code Advisory Commission to review and recommend changes to the State Energy Code.
Governor's Awards	The Energy Office recognizes local governments, state agencies, and educational institutions for exceptional energy-conservation accomplishments.
Rebuild America	U.S. D.O.E. Program supported by Arizona Energy Office help businesses and communities reduce energy use in buildings.
Green Buildings	Green buildings are use design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment The concept includes: - Sustainable site planning - Safeguarding water and water efficiency - Energy efficiency and renewable energy - Conservation of materials and resources - Indoor environmental quality
Leadership in Energy & Environmental Design (LEED)	This program facilitates positive results for the environment, occupant health and financial return. It defines "green" by providing a standard for measurement, prevents false or exaggerated claims, and promotes whole-building, and integrated design process. LEEDS evaluated and recognizes performance in accepted green design categories, existing and proven technologies. There are four levels of certification.
Utility Tracking	Developed by the Energy Office for entities with multiple accounts (e.g., schools, municipalities, large businesses). Uses Microsoft Excel to track utility usage by meter. Captures data from utility's web site. The program identifies problems, and raises questions.
National Industries of the Future	Administered by Department of Energy – Office of Industrial Technologies Nine industries targeted that together supply 90% of the materials vital to US economy. The 9 industries are: agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel. Goal: Promote energy efficiency and manage waste streams.
Industrial Assessment Centers	Administered by DOE, OIT Enables eligible small and medium-sized manufacturers to have comprehensive industrial assessments performed at no cost to the manufacturers. Teams of engineering faculty and students from the center, located at 26 universities around the country, conduct energy audits, or industrial assessment and provide recommendations to manufacturers to help them identify opportunities to improve productivity, reduce waste, and save energy.
Income Subtraction for Construction of an Energy Efficient Residence	For taxable years beginning from and after December 31, 2001, through December 31, 2010, Arizona law (A.R.S. 43-1031) allows a subtraction for a residence that is 50% more efficient than the 1995 Model Energy Code (MEC). The subtraction is allowed for selling one or more new energy efficient residences located in Arizona. The subtraction is equal to 5% of the sales price excluding commissions, taxes, interest, points, and other brokerage, finance and escrow charges. The subtraction cannot exceed $5,000 for each new qualifying residence. A home's energy efficiency must be demonstrated by a score of at least 90 points (indicating that the home is 50% better than the MEC threshold) on a home energy rating. A Certified Home Energy Rater must provide the home energy rating.
Building America	Building America is a private/public partnership that provides energy solutions for production housing. The Energy Office assists in disseminating the results of this effort to the Arizona market place.

Program Title	Program Description
Governor's Smart Energy Usage Program	"Conservation saves money, which makes sense during tight budget times. And decreased energy production saves water, which makes sense during a drought. These two reasons provide more-than-enough motivation to conserve this summer," Arizona Governor Jane Dee Hull said when announcing the Smart Energy: Phase II program for summer 2002. As a result of the success of the 2001 campaign, Governor Hull ordered all agencies under her jurisdiction to take a number of energy-saving steps for the second summer in a row. The Governor also asked that state residents voluntarily comply with the "Arizona Smart Energy: Phase II" program. As part of the Smart Energy: Phase II program, the Governor asked all state employees to implement the following energy saving measures: - Every agency will use power management tools like Energy Star to keep computers, monitors and other devices in stand-by mode when not in use. - Employees will turn off lights and office equipment, as much as possible, when they expect to be out of the office for more than one hour. - Agencies will reduce all lighting that does not affect productivity, health or safety. - Thermostats in all state-controlled facilities will be increased during the months of June though September by two degrees or brought within the 76-79 degree range whichever is greater. - Agencies will implement a professional, casual-dress policy from June through September, consistent with the type of work being performed.

12.8. Potential for Renewable Energy

Pursuant to 40CFR 51.309 (d)(8)(iv), the State of Arizona has made an assessment of areas where there is the potential for renewable energy to supply power in a cost-effective manner. This section summarizes the findings of this assessment beginning with a review of the geographic distribution of renewable energy potential contained in Figures 12-1 through 12-4.

Figure 12-1. Map of Arizona Solar Photovoltaic Resources

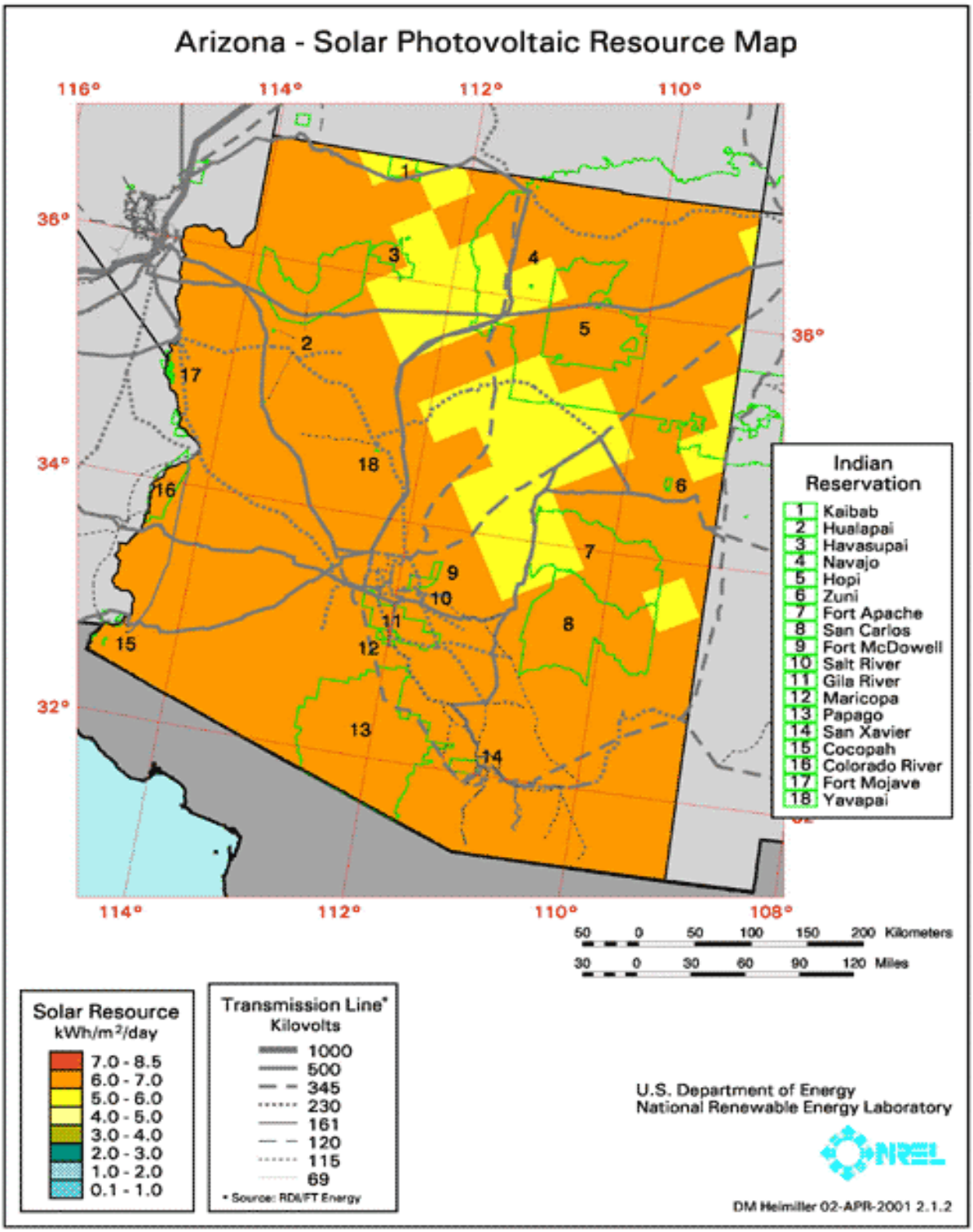


Figure 12-2. Map of Arizona Concentrating Solar Power Resources

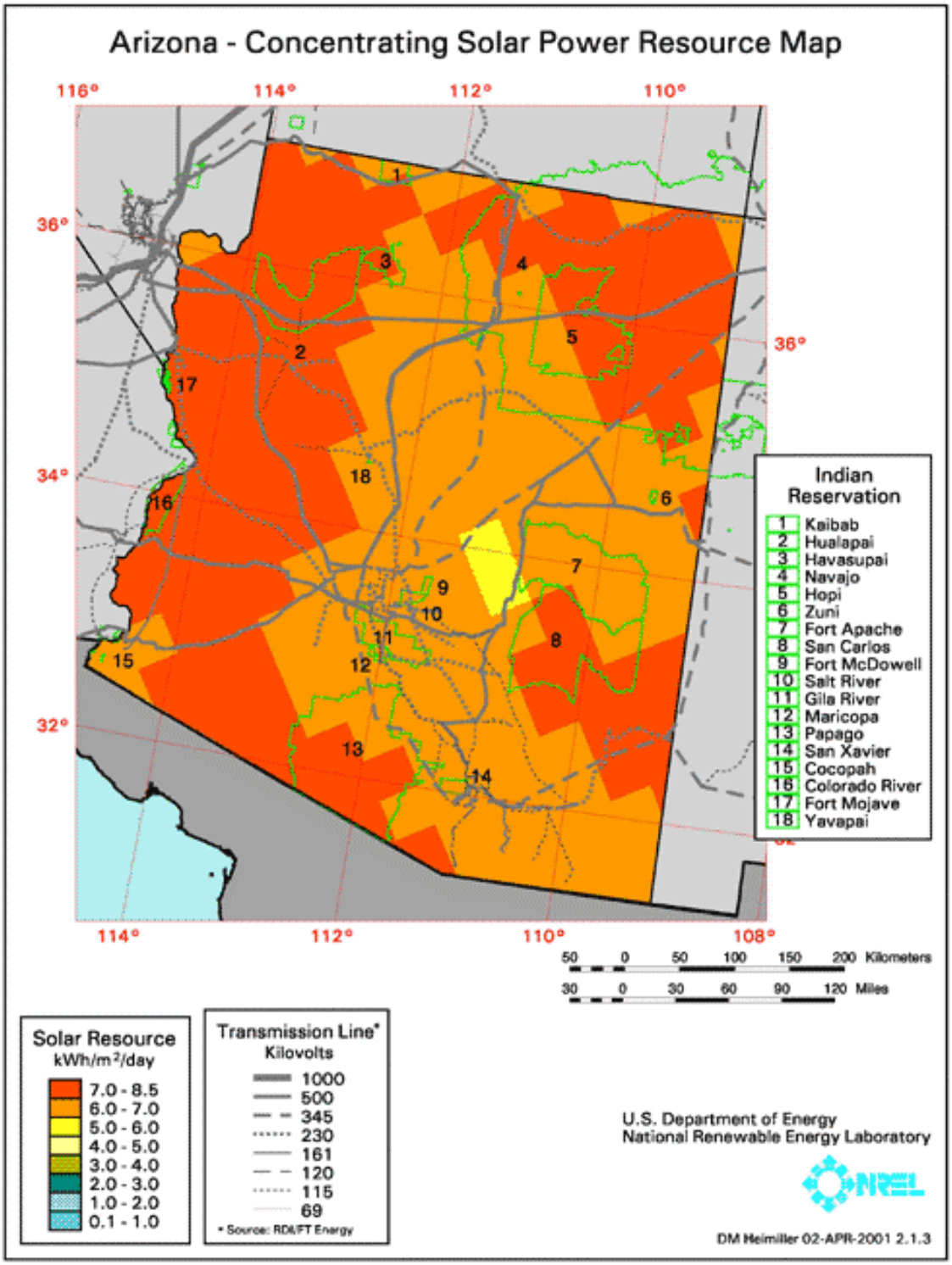


Figure 12-3. Map of Arizona Biomass Energy Resources

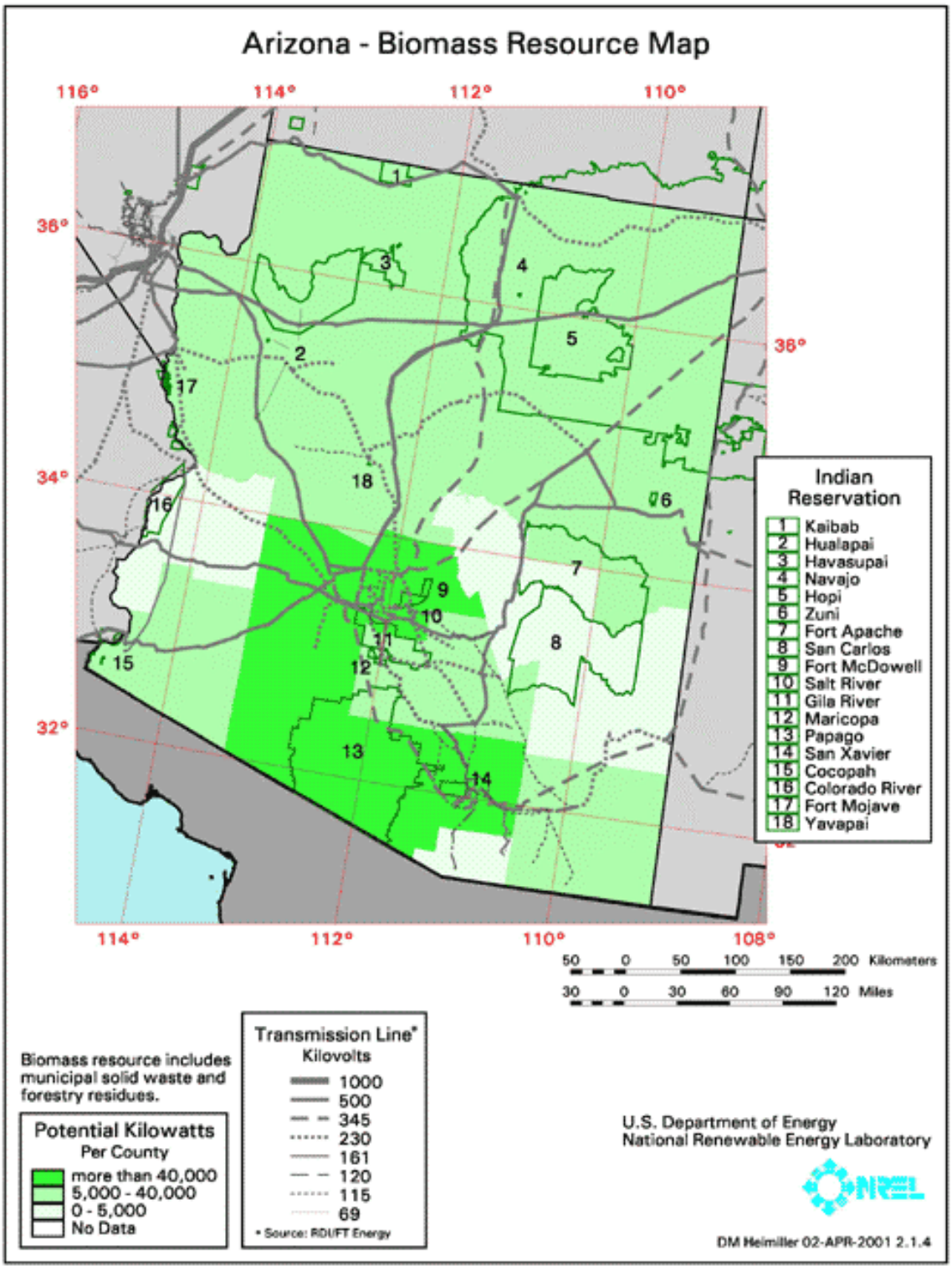
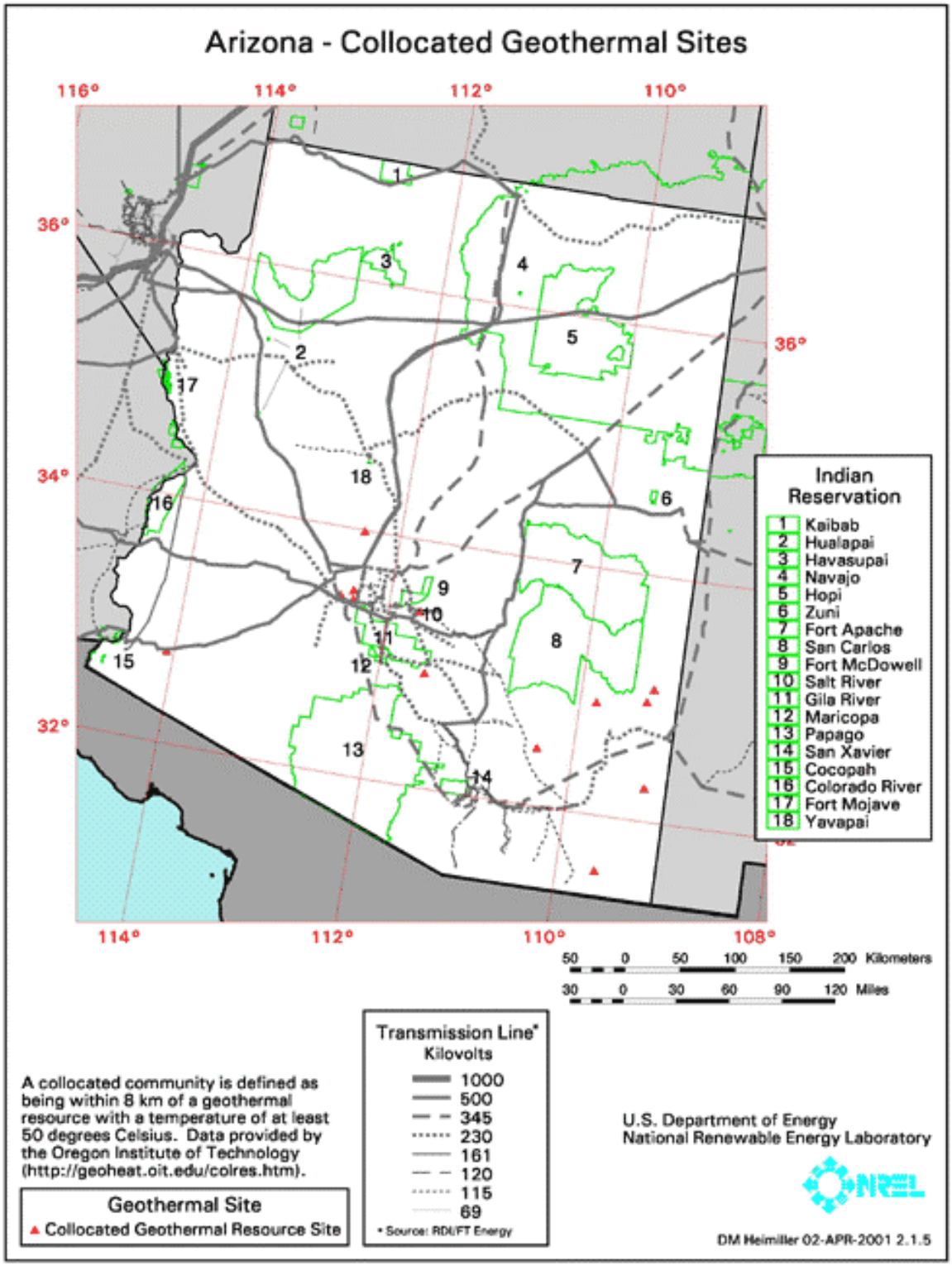


Figure 12-4. Map of Arizona Collocated Geothermal Energy Resources

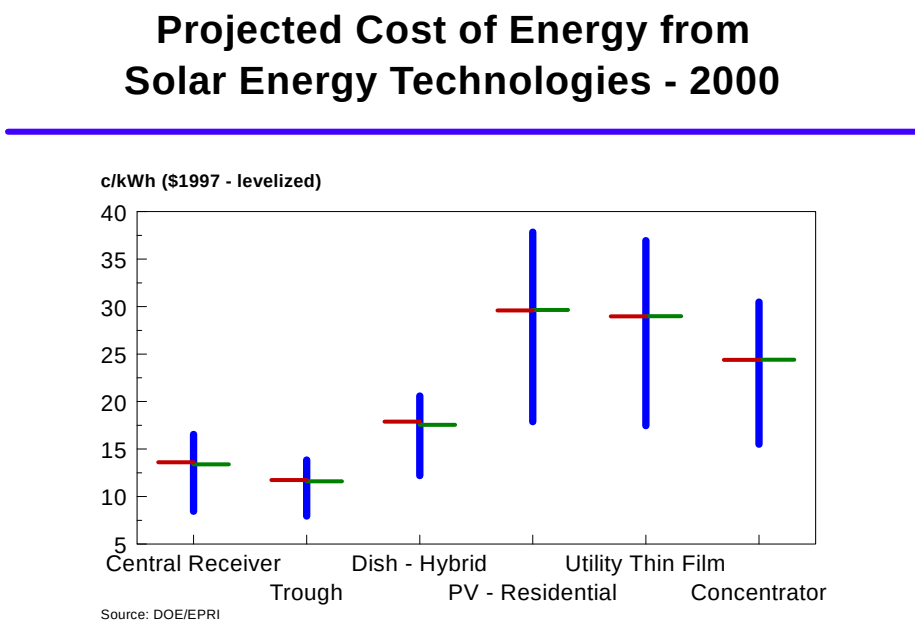


Arizona is not blessed to the same degree with wind resources as Montana, geothermal resources as Nevada, or the hydroelectric resources of the northwest. However, Arizona has renewable energy resources that have yet to be tapped. A consortium of business, government and academic institutions are actively evaluating the state's wind resources. Initial data suggest that commercial-scale wind resources may exist in the state on developable lands. The cost of utility scale wind installations has dropped dramatically in the past decade resulting in a robust new wind industry. Between 2000 and 2001, wind generated installations doubled in capacity and in 2001 alone, 1,700 MW of wind were installed in the U.S. Depending on the wind resource and local, state and federal subsidies, costs are equal to or nearing the cost of generating electricity with conventional fuels.

Projects are underway to evaluate or develop electricity generation projects in two areas of the state. In addition, large reserves of geothermal resources are available for direct use, hot water applications. Renewable resource development is site specific, dependent on access, and availability of transmission, land ownership issues and economics of developing the known resource.

In terms of renewable energy resources, Arizona leads the nation in potential solar-energy resources. Solar electric generating plants cost much more than plants that employ conventional technologies. Large natural gas-fired, combined-cycle plants can be built for approximately six-hundred dollars per kilowatt, while the best solar technologies are still estimated to cost at least six to ten times as much.

Figure 12-5. Projected Cost of Solar Energy Technologies



Source: WRAP AP2 Renewables, "Recommendations of the Air Pollution Prevention Forum to Increase Generation of Electricity from Renewable Energy Resources," p. I-13.

Table 12-9. Cost Estimates of Solar Options

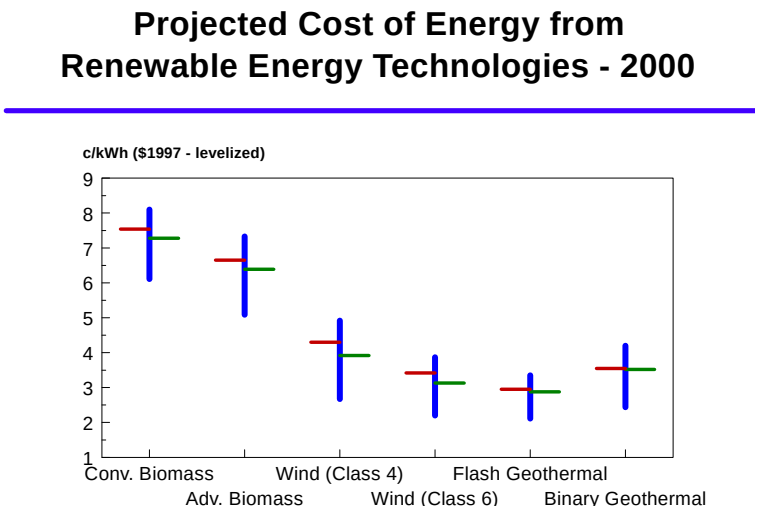
Technology	Plant Size (MW)	Cost ($Million)	Cost per kilowatt
Parabolic Trough	50	200	4,000
Power Tower	15	60	4,000
Dish Engine	1	6	6,000
Photovoltaic	1	6	6,000
Concentrating Photovoltaic	1	6	6,000
Organic Rankine Cycle Trough	1	<5	<5,000

Source: Presentation by Dr. Peter Johnson, Arizona Public Service Company, June 2002

Balanced against the higher capital costs of solar technologies are lower operation and maintenance costs. Fuel is the most expensive component of conventional power generation; sunlight is free. However, a conventional plant can be called on (dispatched) at any time, while solar plants can operate only while the sun is out and generation will be reduced on cloudy days. Because electricity cannot be stored cost effectively, the inability to dispatch the plant is a significant drawback to solar and wind-powered generation. Overall, solar electric generation cannot compete yet with conventional plants on pure economics. But solar generation requires no imported fuel, produces no air emissions, and consumes no water. Further, like any newer technology, it is expected that costs will come down as economies of scale are realized and production techniques improve.

Finally, solar and other renewable generation have cost-effective applications in remote areas where it may be too expensive to extend a power line. For example, solar energy is being used to provide electricity for landfills, ranches, rural streetlights, emergency phones, and entire homes. Solar water heating can be cost effective even in urban areas, particularly in competition with electric water heating. Overall, the next ten years should see substantially increased penetration of solar and other renewable resources into Arizona's generation mix.

Figure 12-5. Projected Cost of Renewable Energy Technologies



Source: WRAP AP2 Renewables, "Recommendations of the Air Pollution Prevention Forum to Increase Generation of Electricity from Renewable Energy Resources," p. I-13.

12.9. Projections of Renewable Energy Goals, Energy Efficiency, and Pollution Prevention Activities

Pursuant to 40CFR 51.309 (d)(8)(v), projections have been made by the WRAP of the short and long term emissions reductions, visibility improvements, cost savings, and secondary benefits associated with "renewable energy goals, energy efficiency and pollution prevention activities." A complete description of the WRAP projections is contained in the report *ICF Assessment of Renewable Energy and Energy Efficiency Programs* included as Appendix A-12c. Projections of visibility improvements for the 16 Class I areas on the Colorado Plateau are provide in Section 14.2. These projections include the combined effects of all measures in this SIP, including air pollution prevention programs. Although emission reductions and visibility improvements from air pollution prevention programs are expected at some level, they were not explicitly calculated because the resolution of the regional air quality modeling system is not currently sufficient to show any significant visibility changes resulting from the marginal nitrogen oxide emission reduction described above for air pollution prevention programs. Details of the modeling methodology are contained in the WRAP TSD in Chapter 8 entitled, "Assessment of Pollution Prevention."

12.10. Programs to Achieve GCVTC Renewable Energy Goal

Pursuant to 40 CFR 51.309 (d)(8)(vi), the programs relied upon by the State of Arizona to demonstrate progress in achieving the renewable energy goal of the GCVTC that renewable energy comprise 10 percent of the regional power needs by 2005 and 20 percent by 2015 are the environmental portfolio standard, and the utility customer funding or system benefit charge funding for renewables in addition to the other programs that are listed in Table 12-2. The approximate percentage of renewable electric energy generated in Arizona for 2002 was 0.08%. Generation capacity as of 2002 is summarized in Table 12-6 above.

Appendix A-12b entitled *Details of Renewable Energy Generation and Capacity* provides additional information on the programs relied upon by Arizona to meeting the 10/20 regional goals. Appendix A-12c entitled *ICF Assessment of Renewable Energy and Energy Efficiency Program*, contains the regional modeling assessment performed by WRAP on the potential economic and visibility impacts associated with achieving the 10/20 regional goals. Section 12.8, above, contains an assessment of the potential for renewable energy resources.

12.11. Future Progress Reports

Pursuant to 40 CFR 51.309 (d)(8)(vi), the State of Arizona commits to submit progress reports in 2008, 2013 and 2018, describing the State's contribution toward meeting the GCVTC renewable energy goals. This description will be consistent with Section 12.9 above. To the extent that is not feasible for the State to meet its contribution to these goals, the State commits to identify measures that were implemented to achieve its contribution, and explain why meeting its contribution was not feasible.

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13. OTHER GCVTC RECOMMENDATIONS

13.1. Regulatory History and Requirements

The recommendations of the GCVTC are presented throughout the June 1996 final report with varying degrees of specificity. Not all are included in the Regional Haze Rule. However, some of the recommendations were intended as a menu of options, with no expectation that any geographic area would implement all of them. The GCVTC pointed out in its final report that:

> Some of the Commission's recommendations ask the EPA to take specific **actions** or institute particular **programs**, in cooperation with the tribes, states and federal agencies as implementing bodies. Other recommendations provide a range of potential policy or strategy **options for consideration** by the EPA and implementing entities. As the EPA develops policies and takes actions based on this report, this distinction between "actions" and "options" should be maintained with diligence. That is, recommendations intended as policy options should not become mandated actions or regulatory programs. [**BOLD** emphasis in original]

13.2. Other Long-term Strategy Components

(a) Evaluation of additional Grand Canyon Visibility Transport Commission recommendations. Pursuant to 40 CFR 51.309(d)(9), the State of Arizona has evaluated the "additional" recommendations of the Grand Canyon Visibility Transport Commission, to determine if any of these recommendations can be practicably included in this SIP. The State of Arizona reviewed the Commission's 1996 report, *Recommendations for Improving Western Vistas*, to identify those recommendations that were not incorporated into Section 309 of the Regional Haze Rule. This evaluation is described in Appendix A-13a of this SIP.

(b) Implementation of Additional Recommendations. The State of Arizona has identified those additional strategies that have been implemented at the national, regional, state, and local levels. Based on the evaluation made by the State of Arizona, as described in Appendix A-13a, no additional measures have been identified as being practicable or necessary to demonstrate reasonable progress at this time. The State of Arizona will re-evaluate the status of implementation of additional recommendation in future plan revisions required under 40 CFR 51.309(d)(10).

13.3. Sources In and Near GCVTC Class I Areas

Pursuant to 40 CFR 51.309(d)(9), the SIP must provide for implementation of all other recommendations in the Commission report that can be practicably included as enforceable emission limits, schedules of compliance or other enforceable measure to make reasonable progress toward remedying existing and preventing future regional haze in the GCVTC Class I areas. The GCVTC report also recognizes the importance of visibility issues related to emission sources in and near Class I areas and includes recommendations regarding emissions within and near these areas. In addition, the GCVTC recommendations for road dust include actions contained in the "In and Near" section of the report to address the control or reduction of emissions related to road dust.

The State of Arizona has in place existing strategies to address the requirements of 40 CFR 51.309(d)(9) for area sources of dust. The State of Arizona commits to the evaluation of sources of dust in and near the GCVTC Class I areas and will develop and implement controls as necessary to

demonstrate reasonable progress toward the national goal in future SIP revisions as required under 40 CFR 51.309(d)(10).

The State of Arizona continues to address the impact of road dust and other dust sources at the Colorado Plateau Class I areas and has reviewed, with the help of Federal Land Managers (FLMs) with knowledge of the Grand Canyon National Park, Mt. Baldy Wilderness Area, Petrified Forest National Park, and Sycamore Canyon Wilderness Area, the type of localized sources of dust that may affect visibility in and near these four areas. Descriptions of the Class I areas and summaries of the observational and quantitative information provided by the Federal Land Managers to the Arizona Regional Haze SIP Dust Management Work Group are found below and in Appendix A-13b, Tables 1 through 4.

In addition, in-and-near micro-inventories are being developed by the WRAP for the four Arizona Class I areas within the 16 GCVTC Class I areas. Further, the Dust Emissions Joint Forum is endeavoring to determine the affects of both regionally and near-field wind-blown dust. This work fulfills the need identified by the GCVTC to develop accurate emission inventories and air quality modeling to determine appropriate emission control strategies from road dust and other dust sources for each Class I area.

13.3.1. Grand Canyon National Park

The Grand Canyon National Park encompasses 1,218,375 acres of the Colorado River canyon and adjacent uplands. This natural preserve is under the jurisdiction of the U.S. National Park Service. Intensive visitor use is confined to relatively small areas on the North and South rims, while most of the park is remote and primitive. Large areas of Forest Service, Tribal, and private lands surround the Park. A summary of emission information for sources of dust within and near the Grand Canyon area is contained in Appendix A-13b, Table 1, including information for paved and unpaved roads and wind generated emissions.

13.3.2. Mt. Baldy Wilderness Area

The Mt. Baldy Wilderness is located in the White Mountains along the southern edge of the Colorado Plateau and comprises 7,079 acres pine and fir forest on the northeastern flank of Mt. Baldy. The Wilderness and areas to the east are primarily under the jurisdiction of the Apache-Sitgreaves National Forest. Tracts of State and private land are also included in this multi-use region. Areas to the west are under the jurisdiction of the Fort Apache Indian Reservation. The FLM survey of dust sources includes information on seasonal recreational access roads. A summary of emission information for the Mt. Baldy area is found in Appendix A-13b, Table 2.

13.3.3. Petrified Forest National Park

The Petrified Forest National Park covers 93,533 acres of grasslands and high desert plateau. State, Tribal, and private land are adjacent to the Park. The FLM survey of potential sources of dust in this popular preserve includes information on wind generated emissions. A summary of emission information for the Petrified Forest area is found in Appendix A-13b, Table 3.

13.3.4. Sycamore Canyon Wilderness

The Sycamore Canyon Wilderness area comprises 55,937 acres of pine and fir forest on the Colorado Plateau and extends southwest, ending at the desert mouth of sycamore creek in the Verde Valley. The wilderness and surrounding area is primarily under the jurisdiction of the Prescott, Coconino, and Kaibab National Forests. Areas of State, Tribal, and private lands are also located near the Wilderness. The FLM survey of potential sources of dust in this recreational area includes information on wind generated emissions. A summary of emission information for the Sycamore Canyon area is found in Appendix A-13b, Table 4.

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14. PROJECTION OF VISIBILITY IMPROVEMENT

The Western Regional Air Partnership (WRAP) performed extensive data gathering and modeling to determine the impact of the regional haze program on visibility at the 16 GCVTC Class I areas on the Colorado Plateau. The WRAP work effort began with development of a regional comprehensive inventory of emissions for all categories of sources. In addition, econometric models and new technology profiles were used to project changes in emissions over time expected from implementation of current requirements under the Clean Air Act (CAA). The WRAP also estimated emission changes resulting from the programs contained in the long-term strategy for regional haze under 40 CFR 51.309.

The emission inventories and projections were then used by the WRAP Regional Modeling Center to estimate aerosol concentrations and visibility changes at each of the 16 Class I areas using the Community Multi-scale Air Quality (CMAQ) model to estimate aerosol concentrations from the emission inventories and projections.

The WRAP results are contained in the WRAP Technical Support Document (WRAP TSD) and include detailed descriptions of the emission inventory and projection methods, as well as the air quality modeling techniques and results (see WRAP TSD Chapter 1). The projection of expected visibility changes are contained in Chapter 2 of the WRAP TSD. The following sections contain an overview of the resultant projected changes in emissions and visibility resulting from the implementation of the Regional Haze Rule.

14.1. Effect on Emissions of Long-term Strategy Components

14.1.1. Inventory Methodology and Scope

The WRAP 1996 base emission inventories used for assessment of visibility included the following pollutants:

- Volatile Organic Compounds (VOCs);
- Oxides of Nitrogen (NO_X);
- Carbon Monoxide (CO);
- Sulfur Dioxide (SO_2);
- Particulate Matter smaller than 10 microns (PM_{10});
- Particulate Matter smaller than 2.5 microns ($PM_{2.5}$); and,
- Ammonia (NH_3).

For visibility modeling, the $PM_{2.5}$ emission inventory was broken down into components, or species, representing the key visibility impairing species of interest. Breaking down the $PM_{2.5}$ into its components is necessary since each component has a different effect on visibility. These $PM_{2.5}$ species are organic carbon particles, elemental carbon particles, and other fine material (soils and dusts). The factors used to allocate $PM_{2.5}$ into its components are based on source-specific speciation factors. In addition, the coarse material (CM) fraction of PM_{10} (i.e., PM_{10} minus $PM_{2.5}$) was also computed, since course particulate matter has a different effect on visibility than fine particulate matter.

The geographic domain for the inventory included the 22 states west of the Mississippi River, and portions of Mexico and Canada. The inventory included emissions from the following categories of sources:

- Area Sources;
- Stationary Point Sources;

- Mobile Sources (both on-road and non-road);
- Road Dust (both from paved and unpaved road surfaces);
- Fire Emissions (agricultural burning, prescribed fire, and wildfire);
- and, Biogenic Sources.

In addition to the 1996 base year emission inventory used for model validation, a projected base year emission inventory for the year 2018 was developed from the base 1996 inventory and other information related to growth and technology issues, but excluding expected changes from control strategies required by the Regional Haze Rule. This 2018 base case emission inventory was then modified to reflect the impact of the control strategies required by the Regional Haze Rule. This is referred to as "Scenario 2" in the WRAP TSD, and are referred to as "2018 w/309" in the tables below.

The ADEQ established an Emission Inventory Work Group (EIWG) made up of key Arizona stakeholders to assist with the review of WRAP's emission inventory for Arizona's SIP sources. This review was performed in two parts.

First, the EIWG reviewed the WRAP's 1996 base emission inventory, comparing estimates with other Arizona reference inventories used for non-attainment SIPs. The EIWG's findings were summarized in a memorandum to WRAP (see Appendix A-14a). The EIWG concluded that the 1996 inventory was adequate for current Regional Haze SIP modeling, but identified several areas that should be addressed in future WRAP emission inventory improvement projects.

Second, the EIWG reviewed the 2018 emission growth/projection factors used to develop the 2018 inventory. This review included an analysis of accuracy of earlier projections, such as the growth factors used in the GCVTC Integrated Assessment System, and more recent projections performed by the Arizona Department of Economic Security, U.S. Census Bureau data, and forecasts prepared by the metropolitan planning organizations. Although differences were found, the EIWG concluded that the long-range forecast factors were within the level of uncertainty in any long-range economic forecast. Areas for future improvement of the WRAP inventory projections were summarized in a memorandum to WRAP (also in Appendix A-14a).

In addition to the EIWG, ADEQ also established the Technical Assessment Work Group (TAWG) to review the assessment and modeling methodologies used by the WRAP. The TAWG reviewed the WRAP TSD and identified areas for future improvements in a memorandum to WRAP (also in Appendix A-14a).

14.1.2. Projected Changes in Emissions for Arizona

The projected change in emissions for the State of Arizona are summarized in Table 14-1. As shown, emissions of sulfur dioxide are expected to decrease by 36% by 2018. In addition, by 2018 emissions of oxides of nitrogen and volatile organic compounds are expected to decline by 16% and 25%, respectively. Table 14-2 shows similar emission reductions for the nine-state GCVTC Transport Region. Appendix A-14b, Tables 1 through 3, provide more detailed summaries of emissions by source category, including emissions estimates for the 2018 WRAP Base Case. Also, Appendix A-14b, Table 4, summarizes the detailed county-level emission for Arizona. Information in Appendix A-14b were derived from WRAP county-level emission inventories contained in the WRAP TSD emission appendices.

Table 14-1. Changes in Emissions from 1996 to 2018 for Arizona Sources (Tons per Year)

Year	$PM_{2.5}$*	CM	SO_2	NOx	VOC
1996	147.9	98.8	217.9	454.0	372.3
2018 w/309	143.3	103.6	139.3	383.2	277.8
% Change	**-3%**	**5%**	**-36%**	**-16%**	**-25%**

* $PM_{2.5}$ includes organic carbon, elemental carbon, and fine soils/dusts.

Table 14.2. Changes in Emissions from 1996 to 2018 for 9 GCVTC States (Tons per Year)

Year	$PM_{2.5}$*	CM	SO_2	NOx	VOC
1996	1,196.7	1,170.6	1,036.3	3,952.1	3,325.3
2018 w/309	1,228.3	1,198.4	808.9	2,691.8	2,339.2
% Change	**3%**	**2%**	**-22%**	**-32%**	**-30%**

* $PM_{2.5}$ includes organic carbon, elemental carbon, and fine soils/dusts.

14.2. Projected Changes in Visual Air Quality

14.2.1. Applicable Class I Areas

This projection of visibility improvement addresses the 16 Class I areas of the Colorado Plateau, as defined in 40 CFR 51.309(b)(1) that are described in Chapter 3 of the WRAP TSD.

14.2.2. Projected visibility improvement

Pursuant to 40 CFR 51. 309(d)(2), Tables 14-3 and 14-4 indicate the projected visibility conditions in deciviews for each of the 16 Class I areas, from the baseline emission projection year of 1996 through December 31, 2018. These projections were made for the 20% worst days and 20% best days, and are expressed in deciviews (dV). The first column represents the best estimate of actual visibility conditions in 1996. Because the IMPROVE monitoring network was significant expanded from 1999 through 2001, the actual visual air quality values in the first column represent the most recent and representative five years of monitoring data from 1997 through 2001. The second column represents the expected conditions in 2018 without the implementation of the strategies and programs contained in this SIP. The final column represents the expected conditions in 2018 with the implementation of this SIP strategies and programs. Chapter 2 and Appendix A of the WRAP TSD describe the control strategies included in the air quality modeling projections.

Table 14-3. Projected Visibility Improvement at the 16 Colorado Plateau Class I Areas in 2018 on the Average 20% Worst Days, resulting from implementation of "All 309 Control Strategies".

Colorado Plateau Class I Area	State	1996 - 20% Worst Days' Visibility (dV) (Base Case)	2018 - 20% Worst Days' Visibility (dV) (Base Case - all controls "on the books" as of 2002)	2018 - 20% Worst Days' Visibility (dV) (All §309 Control Strategies including Optimal Smoke Management)
Grand Canyon National Park	AZ	12.30	11.62	11.51
Mount Baldy Wilderness	AZ	14.30	12.22	11.96
Petrified Forest National Park	AZ	13.00	11.99	11.74
Sycamore Canyon Wilderness	AZ	15.40	11.63	11.48
Black Canyon of the Gunnison NP Wilderness	CO	11.30	10.90	10.60
Flat Tops Wilderness	CO	10.50	11.04	10.73
Maroon Bells Wilderness	CO	10.60	11.15	10.84
Mesa Verde National Park	CO	13.10	12.24	11.84
Weminuche Wilderness	CO	10.60	11.19	10.84
West Elk Wilderness	CO	11.30	11.08	10.72
San Pedro Parks Wilderness	NM	10.70	12.33	11.71
Arches National Park	UT	12.10	12.41	12.15
Bryce Canyon National Park	UT	11.80	12.26	11.95
Canyonlands National Park	UT	12.10	12.41	12.18
Capitol Reef National Park	UT	12.10	12.51	12.36
Zion National Park	UT	13.60	12.13	12.03

Table 14-4. Projected Visibility Improvement at the 16 Colorado Plateau Class I Areas in 2018, on the Average 20% Best Visibility Days, resulting from implementation of "All 309 Control Strategies".

Colorado Plateau Class I Area	State	1996 - 20% Best Days' Visibility (dV) (Base Case)	2018 - 20% Best Days' Visibility (dV) (Base Case - all controls "on the books" as of 2002)	2018 - 20% Best Days' Visibility (dV) (All §309 Control Strategies including Optimal Smoke Management)
Grand Canyon National Park	AZ	4.80	4.76	4.64
Mount Baldy Wilderness	AZ	5.50	5.49	5.36
Petrified Forest National Park	AZ	6.50	5.18	5.10
Sycamore Canyon Wilderness	AZ	6.30	4.85	4.75
Black Canyon of the Gunnison NP Wilderness	CO	4.60	3.89	3.75
Flat Tops Wilderness	CO	3.10	3.96	3.81
Maroon Bells Wilderness	CO	3.10	3.90	3.80
Mesa Verde National Park	CO	5.50	4.40	4.33
Weminuche Wilderness	CO	3.10	3.89	3.74
West Elk Wilderness	CO	4.60	3.97	3.82
San Pedro Parks Wilderness	NM	4.00	5.59	5.36
Arches National Park	UT	5.50	4.85	4.61
Bryce Canyon National Park	UT	4.30	3.91	3.89
Canyonlands National Park	UT	5.60	4.87	4.67
Capitol Reef National Park	UT	5.60	4.85	4.75
Zion National Park	UT	5.90	3.81	3.75

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15. STATE PLANNING/INTERSTATE COORDINATION AND TRIBAL IMPLEMENTATION

15.1. Participation in Regional Planning and Coordination

Pursuant to 40 CFR 51.309(d)(11), the State of Arizona has participated in regional planning and coordination with other states in developing its emission reduction strategies under 40 CFR 51.309, related to protecting the 16 Class I areas of the Colorado Plateau. This participation was through Arizona's leadership of the Grand Canyon Visibility Transport Commission (GCVTC) and participation in the Western Regional Air Partnership (WRAP). The State of Arizona has provided staff in leadership positions of many of the WRAP committees and forums, and encourages participation of Arizona stakeholders in the WRAP process. The State of Arizona has been nominated to assume the position of Co-chair of the WRAP and will continue to participate actively in WRAP activities.

In order to coordinate implementation issues associated with this SIP, the State of Arizona will serve on the recently established "309 Coordinating Committee" of the WRAP. This standing committee is chartered to perform the necessary implementation tracking for the states and tribes submitting SIPs and TIPs to address the requirements of 40 CFR 51.309.

15.2. Applicability to Tribal Lands

Pursuant to 40 CFR 51.309(d)(12), and in accordance with the Tribal Authority Rule (63 FR 7253, February 12, 1998), all Tribes have the option to develop a regional haze Tribal Implementation Plan (TIP) for their lands to assure reasonable progress in the 16 Class I areas of the Colorado Plateau. As such, no provisions of this SIP are applicable to tribal lands.

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16. PERIODIC IMPLEMENTATION PLAN REVISION

(a) Periodic Progress Reports for demonstrating Reasonable Progress. Pursuant to 40 CFR 51.309(d)(10)(i), the State of Arizona commits to submit to EPA periodic progress reports for the years 2008, 2013 and 2018. The demonstration may be conducted by the WRAP, with assistance from Arizona, and shall address the elements listed under 40 CFR 51.309(d)(10)(i)(A) through (G) for the Colorado Plateau areas:

1. Implementation status of this SIP's measures;
2. Summary of emissions reductions;
3. Assessment of the 20% most/least impaired days;
4. Analysis of emission reductions by pollutant;
5. Analysis of significant changes in anthropogenic emissions;
6. Assessment of this SIP's adequacy; and
7. Assessment of visibility monitoring strategy.

(b) Actions to be taken concurrent with Periodic Progress Reports. Pursuant to 40 CFR 51.309(d)(10)(ii), the State of Arizona commits to take one of the following actions based upon information contained in each periodic progress report:

1. Provide a negative declaration statement to EPA saying that no SIP revision is needed if reasonable progress is being made, in accordance with section *(a)* above;

2. If the State finds that the SIP is inadequate to ensure reasonable progress due to emissions from outside the State, the State of Arizona commits to notify EPA and the other contributing state(s), and initiate efforts through a regional planning process to address the emissions in question. The State of Arizona commits to identify in the next progress report the outcome of this regional planning effort, including any additional strategies that were developed to address the plan's deficiencies;

3. If the State finds that the SIP is inadequate to ensure reasonable progress due to emissions from another country, the State of Arizona commits to notify EPA and provide information on the impairment being caused by these emissions; or

4. If the State finds that the SIP is inadequate to ensure reasonable progress due to emissions from within Arizona, the State of Arizona commits to develop additional strategies to address the plan deficiencies and revise the SIP no later than one year from the date that the progress report was due.

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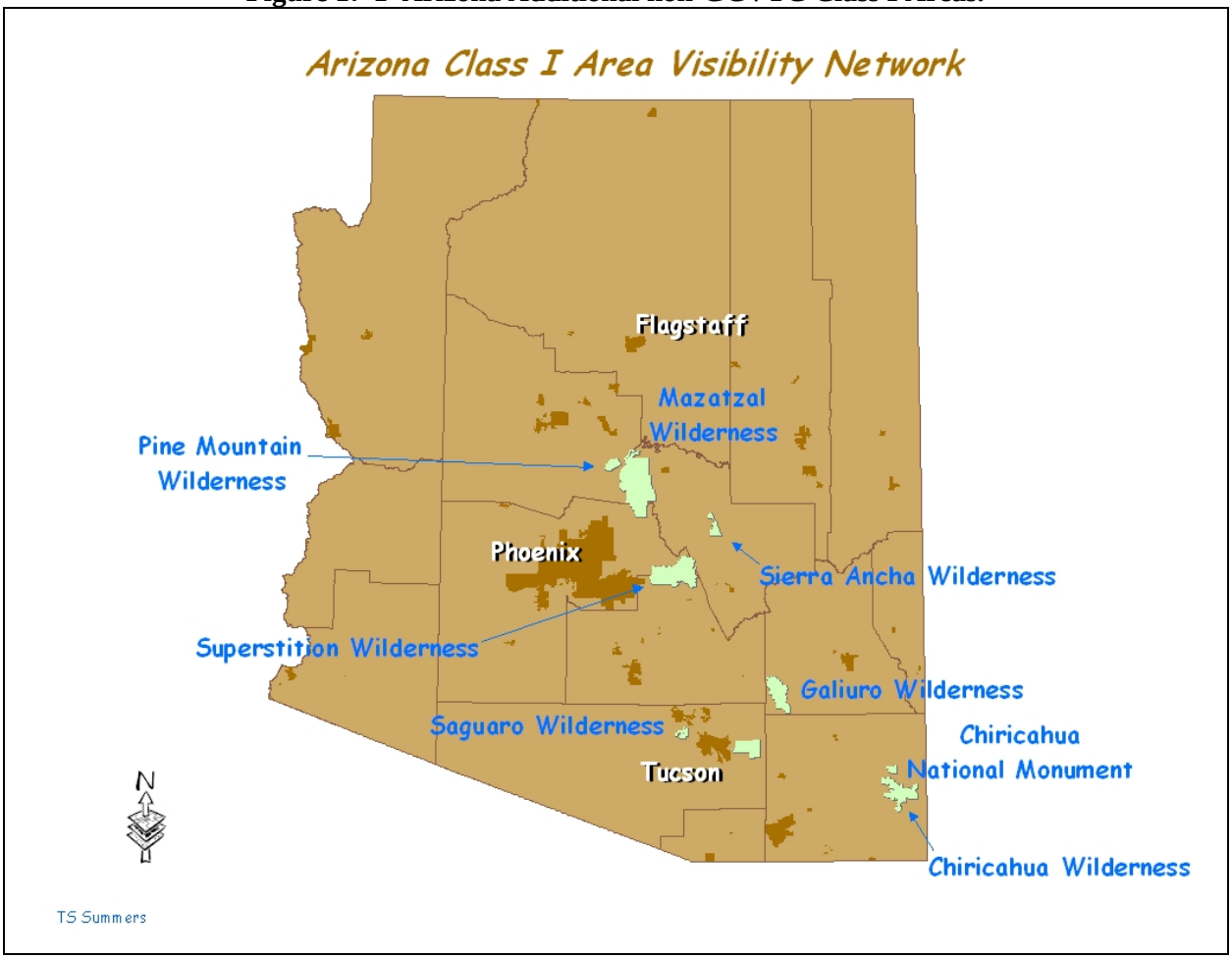
17. DECLARATION OF TREATMENT FOR ADDITIONAL CLASS I AREAS UNDER 40 CFR 51.309(g)

The requirements for reasonable progress for Additional Class I areas are discussed on page 35758 in the Preamble to the RHR. Section 309 of the RHR requires that the first SIP due by December 31, 2003 address the 16 Class I areas of the Colorado Plateau. Additional Class I areas do not need to be addressed until December 31, 2008. 40 CFR 51.309(g)(1) requires states to declare in the SIP due by December 31, 2003 whether the Additional Class I areas will be addressed under 40 CFR 51.308, or under 40 CFR 51.309(g).

a. *Declaration for Additional Class I areas.* Pursuant to 40 CFR 51.309(g)(1), the State of Arizona commits to submittal of a SIP supplement under 40 CFR 51.309(g) for the eight Additional Class I areas in the State of Arizona. Arizona shall submit the SIP revision for the eight Additional Class I areas as early as practicable, but no later than December 31, 2008. The eight Additional Class I areas in Arizona that will be addressed under 40 CFR 51.309(g) include: Chiricahua National Monument and Chiricahua, Galiuro, Mazatzal, Pine Mountain, Saguaro, Sierra Ancha, and Superstition Wilderness Areas. These Additional Class I areas are shown in Figure 17-1.

Figure 17-1 Arizona Additional non-GCVTC Class I Areas.



The State of Arizona, if necessary to address reasonable progress for non-GCVTC Additional Class I areas outside of Arizona, will rely the procedures under 40 CFR 51.309(g)(2) and (3) and submit a SIP revision by December 31, 2008, to address reasonable progress for any such areas.

18. PUBLIC PARTICIPATION AND REVIEW PROCESS

Public participation and review process documents for the rulemakings described in this SIP can be located in the appendix for the related chapter in which those rules are references (e.g., for the RAVI rule see Chapter 5; for WEB trading program rule see Chapter 7; and, for the fire rules see Chapter 10). This chapter contains the public participation and review process documents associated with the SIP only.

18.1. Public Hearing Notice

Notices of the public hearings were published in *The Arizona Republic* (Phoenix and statewide), *The Arizona Daily Star* and *Tucson Citizen* (Tucson Newspapers), and the *Arizona Daily Sun* (Coconino County/Flagstaff) on October 24, 2003. Copies of the notices are contained in Appendix A-18a.

18.2. Hearing Transcripts

Agendas, sign-in sheets, transcripts and hearing officer certifications for the public hearings held on November 24, 2003 in Phoenix, Arizona, and Flagstaff, Arizona, are contained in Appendix A-18b.

18.3. Written Comments Received

Several written comments were received by ADEQ before the end of the comment period (December 3, 2003). These were utilized in finalizing revisions to this SIP and are contained in Appendix A-18c.

18.4. Responsiveness Summary

Based on the oral comments received at the public hearings, and written comments received by the close of the comment period, the State of Arizona made appropriate revisions the Public Review Draft of the SIP released on October 24, 2003. Appendix A-18d contains the response to comments developed by the State of Arizona addressing the requirements under 40 CFR 51.102.

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